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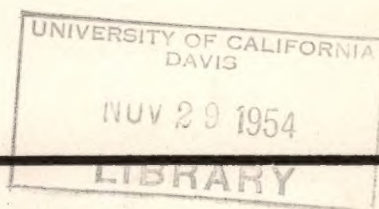
Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

Prices and Marketing Margins for Fruits and Vegetables

2. WEEKLY PRICES AND RETAIL MARGINS— SMALL, MEDIUM, AND LARGE STORES ORANGES, LEMONS, AND GRAPEFRUIT

Denver, August 1948—July 1949

Sidney Hoos



**CALIFORNIA AGRICULTURAL EXPERIMENT STATION
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS**



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Mimeographed Report No. 170

August 1954

Foreword

This report, the second in a series on the prices and marketing margins for fruits and vegetables, is concerned with the analysis of weekly statistics on retail and wholesale prices for the three major citrus fruits--fresh oranges, lemons, and grapefruit. The first report in the series dealt with daily prices.

The study was made through a cooperative arrangement between the Giannini Foundation of Agricultural Economics, California Agricultural Experiment Station, and the former Bureau of Agricultural Economics (now in large part in the Agricultural Marketing Service), U. S. Department of Agriculture. The Foundation assumed basic responsibility for planning and designing of the study; the Bureau assumed basic responsibility for the collection of the sample store data; and the Foundation has basic responsibility for the economic and statistical analyses.

Among the various individuals who participated in the study, specific recognition is given to Dr. George M. Kuznets who designed the sample. Included in the first report is an Appendix Note by him on the design and construction of the sample. Mr. Wendell Calhoun administered the collection of the primary data in Denver and supervised the field work of Mr. Robert E. Beach, Jr., and Mr. Vernon Shahbazian. Dr. D. B. DeLoach, Dr. Kuznets, and Mr. Calhoun also participated in the planning for the study and made helpful suggestions and comments. Mr. Herman Goldhammer was in direct charge of the I.B.M. work when the cards were processed. The essential aid of many statistical assistants is also fully acknowledged, particularly that of Mrs. Hazel Hoehn in Berkeley and Miss Jean Riley in Denver. Recognition is likewise called for of the stores which participated in the study as well as the various individuals in the citrus industries who have supported the study and contributed essential information and aid.

The investigations were financed in part by funds administered under the authority of the Research and Marketing Act of 1946.

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WEEKLY PRICES AND RETAIL MARGINS--SMALL, MEDIUM, AND LARGE STORES
Oranges, Lemons, and Grapefruit
Denver, August 1948-July 1949

by

Sidney Hoos^{1/}

INTRODUCTION AND GENERAL CONCLUSIONS

Introduction.---This report summarizes the results obtained from some analyses of the behavior of weekly prices of the three major citrus fruits. An earlier report was concerned with the daily retail and wholesale prices of oranges, lemons, and grapefruit.^{2/} Here, as in the previous report, particular attention is given to the spread between the retail and wholesale prices.

The introduction to the earlier report outlined the background and setting of the investigation. Rather than repeating such materials in detail here, they are set forth sufficiently to give the reader the necessary orientation. Although both the previous and this report cover some common ground, the views differ. In the former, primary attention was given to the average daily prices and spreads of all of the stores in the sample. In this report, distinction is made between the weekly prices and spreads in various sizes of stores. But here, as in the previous report, each of the major citrus fruits is discussed in detail in a separate section, followed by a summary of comparative findings, and emphasis is directed to price interrelationships as reflected by the price spreads.

The margins or the spreads between farm wholesale and retail prices have for long been a subject of interest and concern to farm groups. Along with, if not as a result of, such interest on the part of organized farm

^{1/} Professor of Agricultural Economics and Economist in the Experiment Station and on the Giannini Foundation.

^{2/} Hoos, Sidney, Daily Prices and Retail Margins, Oranges, Lemons, and Grapefruit, Denver, August 1948-July 1949. Berkeley, 1954. (Calif. Univ. Col. of Agr., Agr. Exp. Sta., Giannini Foundation of Agricultural Economics. Mimeographed Report No. 168)

groups, the U. S. Department of Agriculture followed by various research groups undertook investigations of the nature of the spread between farm and retail prices. Subsequently, some students of marketing, economists, and price analysts began to work in the general area of pricing policies and practices. Thus, the problem of price spreads or what are essentially similar problems became a common focal point for the interests of several different groups.

This report, as part of an investigation into the prices and margins of fruits and vegetables, has been influenced by various interests noted above. On the one hand, there has been the influence of the "agricultural tradition" which has been concerned with the magnitude and behavior of price spreads from the view of equity in distribution. On the other hand, there is the influence of contemporary economic thought concerned with the principles underlying the pricing policies and practices of individual firms. The report, thus, includes information bearing upon not only the level of price spreads but also their determination and behavior characteristics.

The data underlying this report, as the previous one, were collected from primary sources. A complete account of the citrus was made as it passed through the sample stores on to the consumers. From the sample stores was obtained information on each of the lots of citrus purchased by the stores during the year, a "lot" being defined as a specific number of units of a particular grade, size, type, and state of origin of citrus purchased by a store at a specified price at a particular time. For each lot were obtained the dates of purchase and put on sale by the store; the amount sold each day; the date when the lot was sold out; the numbers of units and weight of each lot; specifications of size, grade, type, and state of origin of the citrus; volumes sold and wastage in each lot; the unit price paid by the store; and the retail price charged by the store with amounts sold at each retail price if it changed during the life of the lot. The prices paid by the stores, the wholesale prices in this report, include cost of delivery of the fruit to the store. Thus, the retail and wholesale prices are comparable among the stores as they refer to equivalent points in the stage of marketing.

From the primary lot data sketched above were constructed various types of average prices and related variables for all oranges (also, all lemons and grapefruit) as well as for California oranges separately, for

navel and Valencia oranges separately, and for those various categories broken down into large-, medium-, and small-sized fruit. Average prices and related variables were constructed for lots of fruit by type of store in addition to the time series composed of lot mixes. In this report, however, direct use is made only of the following time series: weekly retail and wholesale prices and the spread between them for all oranges, lemons, and grapefruit, respectively, regardless of grade, size, state of origin, and similar specifications. The analyses and discussion of other types of prices are deferred to subsequent reports.

The weekly retail prices discussed in this report are average prices constructed to reflect the over-all experience of the groups of stores in the sample. The weekly wholesale prices are also averages similarly constructed. These wholesale prices reflect prices paid by the stores for the fruit they sold in respective weeks, that is, the same fruit reflected in the retail prices of the corresponding weeks. The lot mixture in the retail price, for a given week, is the same as for the wholesale price of that week. Thus, the weekly wholesale and retail prices are comparable in that they refer to the same mixes of fruit lots.

As these background comments on the average prices are introduced, it is advisable to note here how the question of wastage or spoilage has been handled. In the U. S. Department of Agriculture reports on retail margins, the convention has been followed of computing wholesale and retail prices on the basis of the quantity sold by the retailer after allowing for spoilage and wastage. With that procedure, average wholesale prices per pound measure the per-pound cost to the store for the number of pounds actually sold to consumers and not the per-pound cost to the store for the number of pounds it purchased. That procedure has been used in some of the analyses in this investigation, and the results will be presented and discussed in certain parts of subsequent reports. But in this report, a different procedure is followed. Here, quantities reflecting wastage and spoilage have not been excluded, and the wholesale prices used are equivalent to those on the invoice received by the retailer from the wholesaler. In other terms, the wholesale prices here reflect the cost per pound to the stores for the volume of fruit they purchased, including that which subsequently may have been classed as wastage or spoilage.

The primary data on wholesale and retail prices, volumes purchased and sold by the stores, wastage, and other statistics analyzed in the investigation originate from a sample of stores in Denver. A detailed account of the sample design and construction has been prepared by Dr. G. M. Kuznets and is included as an Appendix Note to the previous report on daily prices and spreads. Reference is made to his statement for an adequate account of the sample. Here, it need only be noted that over 50 retail stores, including mostly independent but also some local chain units, were selected for inclusion in the sample. Small-, medium-, and large-sized stores are included. The criteria and specifications for the several groups of stores and their representation in the sample are set forth by Dr. Kuznets in his Appendix Note to the previous report.

The basic sample design referred to in the preceding paragraph has been altered in only one respect for the data used in this report on weekly prices and spreads. There were available, as part of the investigation, weekly data from five Denver stores of a national food chain. These five stores meet the specifications set forth for large stores in the study, and their data have been incorporated by appropriate weighting with that of the other stores classed as large ones in the investigation. This gives the experience of the large stores more weight in this report on weekly prices than in the previous report on daily prices. In the daily report, however, attention is not directed to the experience of different-sized store groups, whereas in this report emphasis is given to the differential experience of small-, medium-, and large-sized stores.

The next section of this report is concerned with the discussion and findings for oranges, and the two subsequent sections pertain similarly to lemons and grapefruit, respectively. The fourth section of the report, titled Summary and Comparison of Findings, sets forth the major price and margin findings of the three citrus fruits in a manner so that the results may be compared and contrasted with the objective of emphasizing dissimilarities as well as similarities. The last section of the report, titled Reflections on Setting of Margins, sets forth preliminary views on the pricing policies and practices of various groups of stores in their merchandising of fresh citrus. Those readers who are in the main interested

in only one of the three fruits can review the section on that particular fruit independently of the other sections. Some readers may wish only to review the materials included in the Summary and Comparison of Findings. Other readers may desire to peruse the final section, Reflections on Setting of Margins, as material supplementary to one of the earlier sections of the report. For the convenience of interested readers, the next several pages include some general conclusions and observations drawn from the following sections.

General Conclusions.--As a preview of the nature of the findings discussed in detail in the following sections, here are set forth some general conclusions. They suggest in broad terms the contents of the report and its substantive results. The analyses from which the results are derived, however, are discussed in the respective subsequent sections of the report.

For oranges and lemons as well as grapefruit, large stores, on the average, quoted lower retail prices than did medium- or small-sized stores. When the medium and small stores are compared, no consistent pattern is found. The small stores had slightly lower average retail prices for oranges and grapefruit than did the medium-sized stores. But, in fresh lemons, the small stores averaged a slightly higher retail price than did the medium-sized stores. That the large stores averaged the lowest prices is less striking than the fact that small stores underpriced the medium-sized ones in both fresh oranges and grapefruit.

The weekly retail prices of fresh grapefruit fluctuate over time relatively more than do those of fresh oranges and lemons, the latter two fruits having about equal variability. The retail prices in the small-and medium-sized stores have about equal variability, each being substantially less than the relative variability in large stores.

In the purchase of fresh citrus fruits, the large stores tend to buy at lower wholesale prices than do the other stores. The tendency was less pronounced in grapefruit than in oranges and lemons. The small stores tend to pay higher wholesale prices, with the tendency being less strong for grapefruit than for oranges and lemons.

The large stores have greater variability over time in their wholesale prices for oranges and grapefruit than do the other stores. But in lemons, the large stores have about the same variability in weekly wholesale prices as do the medium-sized stores, with each having slightly

greater variability in weekly wholesale prices than do the small stores. In oranges and grapefruit, however, the small- and medium-sized stores experienced about the same degree of variability over time in their wholesale prices.

For all three of the fresh citrus fruits, the absolute spread between the weekly retail and wholesale prices was wider in the medium-sized stores than the small or large stores. The large stores averaged the narrowest absolute spread in each of the citrus fruits, although in grapefruit the spread in the small stores was almost as narrow as the spread in the large stores. For oranges and grapefruit, the narrowest spread in the large stores is much clearer.

The medium-sized stores had the lowest and the large stores had the highest degree of variability over time in the weekly absolute spread between retail and wholesale prices. All three groups of stores had their greatest variability in the weekly absolute spread of grapefruit, although in the medium-sized stores there was very little difference between grapefruit and lemons. All three store groups had their lowest variability in the weekly absolute spread of lemons, but in the large stores there was only a slight difference between oranges and lemons.

Although the small stores generally paid higher prices for their citrus than did the medium-sized stores, the small stores had sufficiently narrower spreads so that they were able to compete pricewise with the medium stores. The large stores were generally in position to have lowest retail prices, in part because they purchased their citrus most cheaply and in part because they accepted narrower average spreads than the other stores.

The evidence does not support the view that the small stores operate with spreads wider than both large- and medium-sized stores. Nor is it evident that the retail price position of the large stores is due mainly to their willingness to accept much narrower spreads; their wholesale price position is of equal or more importance in accounting for their retail price position. In terms of gross earnings in relation to investment in citrus fruit, the large stores fare comparatively well, especially when consideration is given to their larger volume and inventory turnover. In that respect, the small stores generally do not fare as well as the medium-sized ones.

The relationships among the weekly retail and wholesale prices of the three citrus fruits were further examined in terms of the relations of the spread to the prices. The evidence indicates that, for all stores combined, the weekly retail prices and absolute spreads for oranges are more closely related than they are for lemons, with the retail prices and absolute spreads for grapefruit being least related. Although the absolute spreads and retail prices generally tend to change in the same direction, the degrees of relationship vary among the three fruits as well as among the store groups. Changes in the weekly retail price occur along with differing changes in the absolute spread, depending on the particular fruit and store group considered. Similar conclusions pertain to the relations among the weekly wholesale prices and the absolute spreads and also apply to the relations of the weekly relative spreads to the retail and wholesale prices, respectively. Generally, not always, a negative correlation and regression prevail among the relative spread and the weekly prices. The results provide little basis for making nice and simple clear-cut statements about the relations of the absolute and relative spreads to the retail and wholesale prices which would apply invariably with a reasonable degree of accuracy to each of the three citrus fruits and at the same time to each of the groups of stores--small, medium, and large.

When the weekly absolute spreads are related to the weekly retail sales volume, we again find mixed results. In oranges and grapefruit, a negative correlation prevails among the weekly absolute spread and the weekly retail sales volume, but a positive correlation is found for lemons. These generalizations apply to small and medium as well as large stores but in varying degree. In all three of the citrus fruits, only minute changes in the weekly relative spread appear to be associated with changes in the retail weekly sales volume, and the directions of associated change are not consistent among the three fruits.

The differing behavior characteristics of the prices and spreads for oranges, lemons, and grapefruit suggest that retail merchants follow differing pricing procedures for the several fruits and that the pricing practices differ among various types of stores. With such diversity as background, questions related to the setting of margins are considered from the views of business practices and their relation to pricing policies.

No single and invariant procedure of margin determination is evident for all of the stores. The results appear to reflect a wide diversity of pricing policies and practices. Individual stores may vary their pricing procedure over time. Among the pricing practices which yield results consistent with those found in the study are: constant absolute spread, constant relative spread, varying absolute and relative spreads, "follow the leader" pricing, "meeting" or "beating competition," and the classic short-run profit maximization. When the study results for oranges are subjected to the test of short-run profit maximization, it is found that the actual volume of orange sales, average per store per week, falls short of the maximizing optimum volume. The actual as per cent of the short-run, profit-maximizing volumes are as follows by store groups: average for small stores, 40 per cent; medium-sized stores, 44 per cent; and large stores, 74 per cent.

Thus, there is available some empirical evidence on the extent to which short-run "profit maximizing" prevails in the retail merchandising of fresh citrus. Yet, the apparent fact that short-run profit maximization is not fully attained in oranges does not necessarily impinge upon the "rationality" of the stores' pricing policies and practices. They may appropriately and rationally be based upon the stores' objectives of long-run maximum profits from the purchase and sale of multiple products which include a wide range of food and household products as well as oranges, lemons, and grapefruit. It is at this very point that the theory of the firm presently rests uneasily--the need for developing an operationally and analytically acceptable multiple products theory which adequately accounts for behavior consistent between short-run and long-run objectives.

ORANGES: WEEKLY PRICES AND RETAIL MARGINS

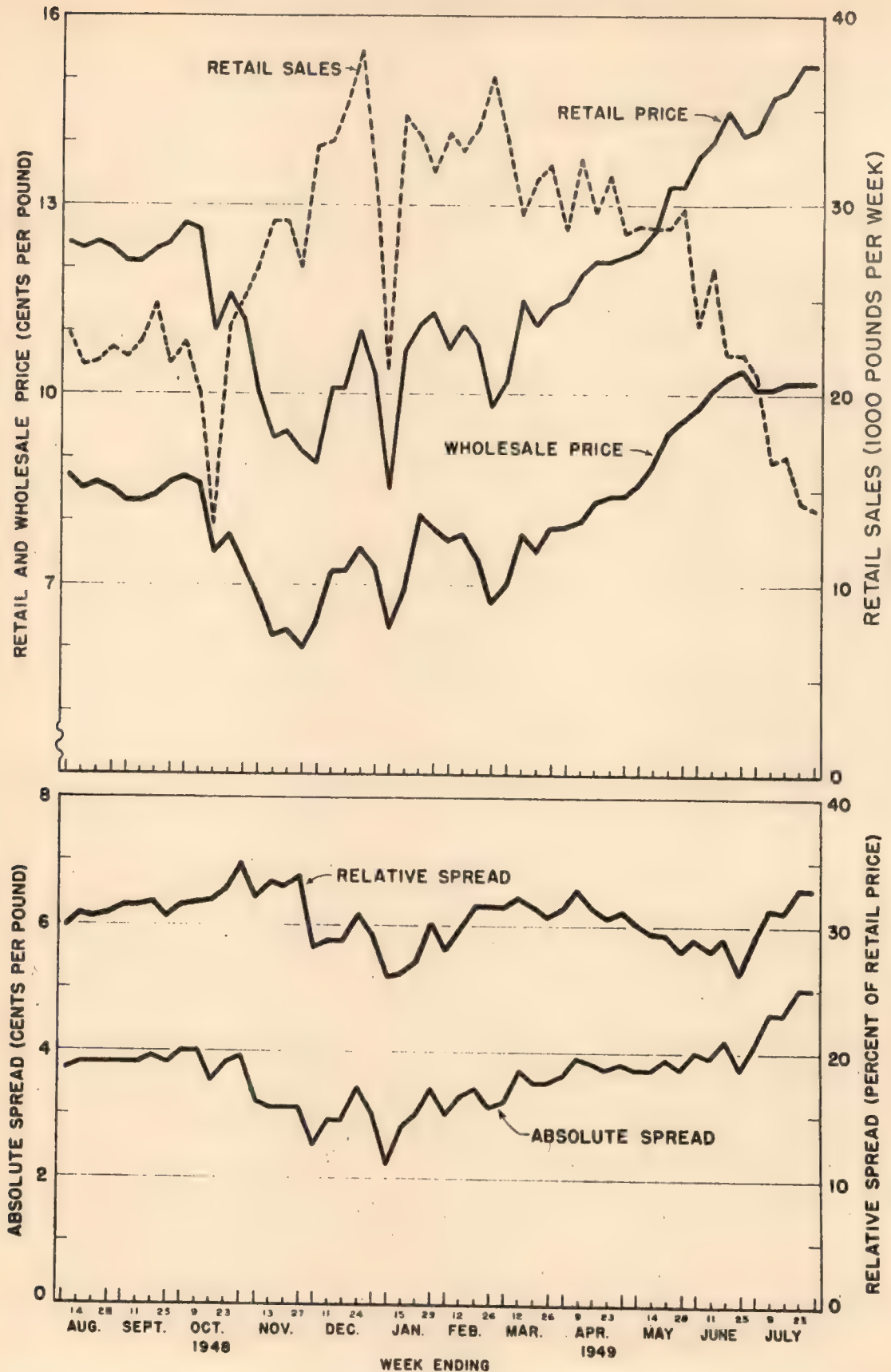
The study's statistical record of average weekly wholesale and retail orange prices, and the spread between them, is summarized in Figure 1. The data cover the year from the beginning of August 1948, to the end of July 1949. The period includes the summer and winter seasons and a series of weeks during which both the prices and sales of fresh oranges varied over a wide range.

The retail sales shown in Figure 1 are the total for all of the stores in the sample. Also, the retail sales include all the various sizes and grades handled by the sample stores during the respective weeks of the year. Oranges of differing varieties and originating in the several producing states are grouped together. Thus, the statistical record reflects the over-all fresh orange situation in Denver during the period, without particular attention to the differing records of prices and sales by sizes, grades, or states of origin of the oranges. Consideration of such differences is reserved for later discussion. This report is concerned with the over-all situation to give a broad picture of the general behavior of fresh orange prices in the market investigated.

Although the weekly levels of retail orange sales shown in Figure 1 reflect the total for the sample stores grouped all together, the trend in weekly sales during the year is descriptive of that for Denver and, in fact, for the country at large. The marked rise in sales beginning in October, advancing to a yearly high in December, reflects the growing supplies of winter oranges from all the major producing states. The gradual decline in sales from the later winter or early spring months is accounted for by the depletion of the supplies of winter fresh oranges and the return to the summer season when Valencias from California dominate the fresh orange market. The general profile of retail sales pictured in Figure 1, thus, represents the total seasonal flow of fresh oranges from producing areas to consuming markets.

Weekly Wholesale and Retail Prices of Oranges.--The top panel of Figure 1 also shows the trends in the average weekly wholesale and retail prices of fresh oranges. The retail prices shown there are over-all averages reflecting all the grades and sizes of fresh oranges, as well as their states of origin, sold by the stores in the respective weeks. The retail

FIGURE 1. ORANGES; RETAIL AND WHOLESALE PRICES, RETAIL SALES, AND SPREAD BETWEEN RETAIL AND WHOLESALE PRICES WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



average prices are based on individual daily transactions, with each daily price being weighted by its corresponding volume of retail sales to arrive at the weekly average price. Thus, the average retail price for a particular week is related to the retail sales volume, also shown in Figure 1, of that same week.

In broad terms, the pattern of seasonal behavior in the retail prices is inverse to the pattern of seasonal behavior in the retail sales. But during some shorter periods of several weeks, the retail sales and prices move in the same rather than opposite direction. Generally, the retail prices decline as the sales volume of winter oranges increases, then recover by advancing as the winter season merges into the season for summer oranges.

Examination of the top panel of Figure 1 clearly shows how the weekly movement of the average wholesale price during the year corresponds very closely to the weekly movement of the average retail price sketched just above. The degree of positively correlated movement of the two prices is very high. Although there are some exceptions, the two prices move together and in the same direction from week to week; when changes over several weeks are considered, the two prices invariably move in the same direction but not necessarily by the same amounts.

The wholesale prices in Figure 1 also reflect the behavior of all grades and sizes and oranges from the different producing states. The average weekly wholesale prices are based on individual daily wholesale prices, each of which is weighted by its corresponding volume; but the volumes used as weights are those sold by the stores on that particular day. Thus, the wholesale prices considered here may be described as weekly average wholesale prices for the oranges sold by the stores in the various weeks. Such wholesale prices measure the level of prices paid by the stores for the oranges they sold in a particular week. A clear understanding of this type of wholesale price is essential since it is used throughout this report. An example, therefore, is in order. The last wholesale price shown in Figure 1, top panel, is for the week ending July 30 and is equal to 10.2 cents per pound. This means that, for the oranges sold at retail by the stores during the week ending July 30, the retailers as a group paid an average price of 10.2 cents per pound. Some

of the oranges sold by the retailers during that week may have been purchased by them in that week, but some of the oranges also sold by the retailers in that same week may have been bought by them earlier such as during the previous week or two weeks earlier. The wholesale prices considered here are constructed so they measure the prices paid by retailers for fruit they sold at retail in a given week, rather than for the fruit they bought at wholesale in that week. The two types of wholesale prices differ in construction and measure different things. The type we consider in this report is constructed to measure the wholesale cost to retailers of the oranges they sell in a given week, regardless of when the retailers purchased the oranges.

The use of wholesale prices which reflect the cost to the retailers of the oranges they sell at retail in a given week is advantageous for the purposes of this report. If, for example, the actual margin obtained by the retailer is to be measured, then it is necessary to compare the price he receives for the oranges with the prices he pays for them regardless of when he bought them. These questions involved in using wholesale prices constructed as indicated above, in contrast with other types of wholesale prices, are discussed in considerable detail in the reports dealing with daily prices of fresh citrus.^{1/}

During the year reflected in Figure 1, both the average weekly wholesale and retail prices varied over a wide range. The seasonal decline and subsequent rise in the wholesale and retail market prices have superimposed on them short-run fluctuations resulting from various influences. Some of these are changing basic economic conditions such as general supply and demand for citrus. Of some significance is the rather severe freeze in California in January 1949 which affected the general price level for citrus rather than its price structure. But some part of the weekly fluctuations in the prices reflects the changing composition of the oranges bought and sold. Varying proportions of different grades, sizes, and types of oranges, from week to week, result in varying prices reflecting the changing structure of the orange supply composition. Such price

^{1/} For further discussion on the distinction between the two types of wholesale prices, see Sidney Hoos, Daily Prices and Retail Margins, Oranges, Lemons, and Grapefruit, Denver, August 1948-July 1949. Berkeley, 1954. (Calif. Univ. Col. of Agr., Agr. Exp. Sta., Giannini Foundation of Agricultural Economics. Mimeographed Report No. 168)

variation, however, is of a shorter run nature than the price change associated with the seasonal shifts in supplies of the orange supply in the aggregate.

As a result of all the influences affecting the wholesale and retail market prices, much price variation occurred during the year. The wholesale price reached a low of 6 cents and by near the end of the year had risen about 80 per cent. The retail price also varied widely from a low of about 8.5 cents a pound to a high of over 15 cents a pound at the end of the year. Such wide variation in the price of fresh oranges during the year is not unusual.

From the upper panel of Figure 1, it is evident that the general movements of the weekly wholesale and retail prices for fresh oranges are very similar. Examination of the lower panel of Figure 1, however, clearly shows what similarity in fact exists. The weekly absolute spread in cents per pound measures the extent to which the weekly retail price is above the wholesale price. The relative spread is the absolute spread, just defined, expressed as a per cent of the retail price. Both the absolute and relative weekly spreads are broad averages reflecting various grades, sizes, and kinds of oranges since the basic price series from which the spreads are computed are such broad averages.

The average weekly absolute spread varied from slightly over 2 cents per pound to 5 cents per pound, with the average for the year as a whole at 3.6 cents per pound. In the first two months of the year, the absolute spread was remarkably stable at almost 4 cents, but then a decline developed and continued until the end of December. After that, the absolute spread advanced and did so sharply during the last month of the year. This attention is directed to the behavior of the absolute spread for comparison with the movements of the retail and wholesale prices. A high degree of correspondence is evident, with the absolute spread being somewhat more closely correlated to the retail price than to the wholesale price. The essential point is that the absolute spread exhibits a behavior over time generally similar to the prices, and it appears that the spread is functionally related to the two prices rather than fluctuating independently of them. As a first approximation, we can say that there is a tendency for the absolute spread to be positively correlated with the

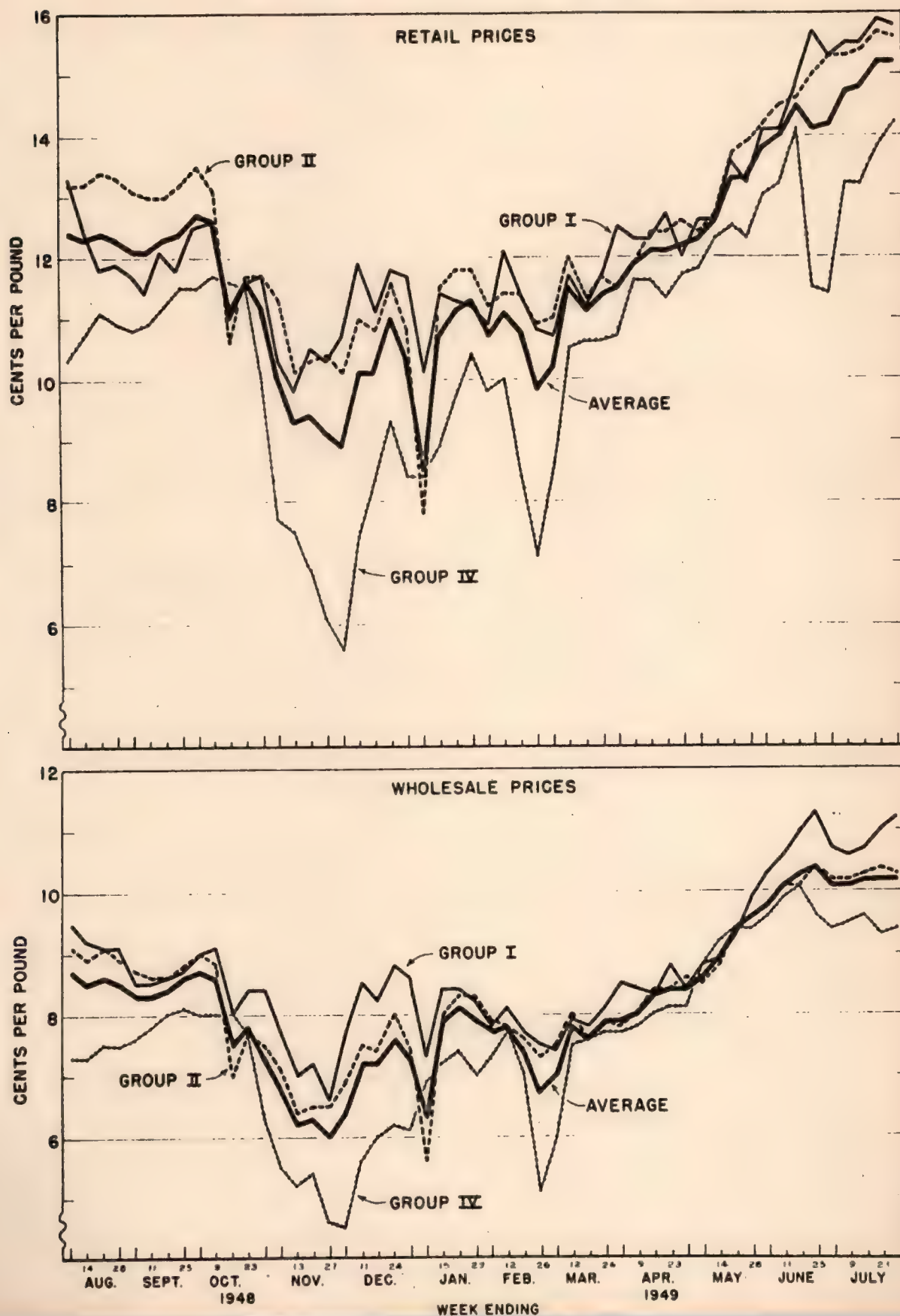
prices and more strongly so with the retail price than with the wholesale price. Thus, the absolute spread in cents per pound does not remain constant but changes over time--during some periods substantially so--and moves along in a fashion somewhat the same as the prices.

When the behavior, over time, of the relative spread is examined, several features appear prominent. There is no pronounced seasonal trend during the year. During the first several months of the year, the relative spread tended to rise; but during the rest of the year, there were intermittent periods of advances and declines in the relative spread. For the year as a whole, the average weekly relative spread fluctuated about the level of 30 per cent. During no week did the relative spread rise about 35 per cent and during no week did the relative spread fall to a level of 25 per cent. Thus, the relative spread varied within a somewhat narrow range. This tendency for the relative spread toward a high degree of stability over time is in marked contrast to the much less stability of the absolute spread. A consequence of this difference and what is apparent from Figure 1 is that, whereas the absolute spread bears a direct positive correlation to the prices, especially the retail price, the relative spread appears to bear little relation to the level of the prices. This preliminary distinction in the behavior of the two types of spreads will be referred to again later when we consider the pricing practices of orange retailers setting their retail prices for the oranges they sell.

Behavior of Weekly Retail Prices of Oranges.--More detailed pictures of the orange prices and spreads are presented in Figures 2 and 3. There are shown the weekly prices and spreads for three groups of stores. The upper panel of Figure 2 depicts the weekly average retail prices experienced by the three sizes of stores. Group I includes small stores, Group II includes medium-sized stores, and Group IV includes what are classified as the large stores.^{1/} But the prices pictured in Figure 2, by store groups, are still averages for all grades, sizes, and types of oranges handled by the stores. Thus, the broad over-all averages shown in Figure 2

^{1/} The composition of small, medium, and large stores in the sample is specified in the Appendix Note, Design of Sample, in the previous report on Daily Prices and Retail Margins; although for the group of large stores analyzed in this report, the large stores group in the basic sample was modified as noted on p. 4 .

FIGURE 2. ORANGES; RETAIL AND WHOLESALE PRICES, BY STORE GROUPS
WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



are now disaggregated to the extent that differences among the three store size groups are evident,

The heavy solid line in the upper and lower panels of Figure 2 shows the same broad over-all average of all store size groups given in Figure 1. These over-all averages are repeated in Figure 2 so the reader may compare the individual group prices with the over-all average as well as with the average prices for other store size groups. That way, at least in rough terms, one may note the structure of orange prices as it is related to the composition of the price experience of large, medium, and small stores. We thus have introductory empirical evidence on the similarities and differences in the wholesale and retail prices of the several size groups of retail stores.

Study of the upper panel of Figure 2 leads to several preliminary conclusions about how the retail orange prices differ among the several store groups. But, also, certain similarities are evident. Let us first describe the characteristics which tend to apply to all three of the store groups.

It is evident that the broad general profile of movement in the retail price during the year is somewhat similar for all of the stores. The rise during the early part of the year, followed by a decline then a tendency to advance from early January on, is characteristic of each of the store groups. There also is a tendency, for which there are some important exceptions, for the short-run fluctuations in the retail price to occur simultaneously in the several store groups.

But the differences among the retail prices of the three store groups are striking and merit detailed attention. This is so not only because of the widespread interest in the price levels for products in large stores as compared with smaller ones, but also because of the relationships between their retail and wholesale prices to be considered below.

As is evident in the upper panel of Figure 2, the retail price of oranges in the Group IV large stores most of the time is less than the retail prices in the medium-sized or small stores. Exceptions occurred only twice during the year analyzed, during the weeks ending November 16 and January 8, respectively. But distinction between average retail prices in the medium and small stores is not so evident from Figure 2. The general picture, hence, is summarized in the following table:

TABLE 1
Average Weekly Retail Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	11.5	13.1	12.2
Group II stores	11.7	13.1	12.4
Group IV stores	9.6	11.5	10.5
All stores combined	11.0	12.6	11.8

From the above data, it is clear that the semiannual and annual average retail prices of oranges in the small- and medium-sized stores are about the same. No significant difference is apparent. The large stores, however, do reflect lower average retail prices, and this is so for both the first and second halves of the year. Whether such lower prices reflect differences in sizes, grades, or types of oranges handled is still a mute question, consideration of which must be deferred for now.

But lower average retail prices is only one distinguishing characteristic of the behavior of retail prices for oranges sold by what are classified as large stores. Another is the relative variability or degree of fluctuation in the retail prices. Some evidence on this point may be suggested by the following data:

TABLE 2
Coefficients of Variation in
Average Weekly Retail Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	7	13	13
Group II stores	12	12	13
Group IV stores	19	15	19
All stores combined	11	13	14

These data provide a basis for concluding that the retail prices of oranges in the large stores fluctuate relatively more from week to week than do the retail prices in the other two groups of stores. There appears to be very little difference in the relative variabilities of retail orange prices in the small- and medium-sized stores.

When we examine Figure 2 closely, we see not only that the weekly fluctuations in the retail prices of Group IV stores are greater than for the other stores, but also we see that during some parts of the year a sharp decline occurs in the large stores retail price with only a very moderate decline or none at all in the orange retail prices in the other stores. Such developments occurred three times during the year examined, November, February, and June. This is not to suggest a regular season of that timing; such wide fluctuations may occur at any time throughout the year since, as noted later, they are related to the wholesale price movement. But it is clear that the large stores have marked swings in their retail prices, and such swings are irregular in timing. This type of behavior is in addition to the tendency for the level of Group IV retail orange prices generally being under those of the other two groups of stores.

Two questions immediately arise: Why do the average weekly retail prices for fresh oranges strongly tend to be lower in the Group IV stores than in the smaller ones, and why do the average retail prices for fresh oranges in the large stores tend to be more volatile or fluctuate more than do the retail prices in the medium- or small-sized stores? To throw light on these questions, we look at the average weekly wholesale prices and the spreads between the weekly retail and wholesale prices of oranges.

Behavior of Weekly Wholesale Prices of Oranges.--In the lower panel of Figure 2 are shown the average weekly wholesale prices of oranges experienced by the three store groups during the year. These wholesale prices show the average store costs for the oranges sold at the retail prices charted in Figure 2. Examination of the structure of wholesale prices and comparison with the structure of retail prices suggest certain similarities. The same periods for which the wholesale prices of Group IV are below those of the other stores are also the periods during which the retail prices of the Group IV large stores are below those of the

other stores. The time intervals during which the wholesale prices paid by the large stores go much under the prices paid by other stores are also the time intervals when the retail prices of the large stores are considerably less than the retail prices in the stores in the other two groups. There is the inference, hence, that one of the reasons accounting for the differential behavior of the retail prices in the several groups is the differential behavior of their respective wholesale prices. But before going into this matter further, let us first note some of the differential characteristics:

TABLE 3
Average Weekly Wholesale Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	8.3	9.2	8.8
Group II stores	7.9	8.9	8.4
Group IV stores	6.8	8.4	7.6
All stores combined	7.6	8.8	8.2

The preceding averages of weekly wholesale prices paid by the several store groups for the oranges they sold suggest several significant tendencies. Not only do the data support the notion that the large stores generally purchase their oranges at lower prices than do the other stores, but the medium-sized stores appear to have a like advantage over the small stores. These tendencies prevailed during both the first and second halves of the year being considered. They are general tendencies, although in some periods they are upset and the wholesale prices of all three groups of stores run along about together. During no prolonged period, however, do smaller stores buy their oranges at lower prices than do the larger stores. It is usual, in fact, for the stores which qualify or are classified as the large ones to purchase their oranges more cheaply than smaller stores.

Let us now look at the degree of variability in the weekly average wholesale prices as summarized in the following data:

TABLE 4
Coefficients of Variation in Average
Weekly Wholesale Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	8	14	12
Group II stores	13	12	13
Group IV stores	16	14	19
All stores combined	12	14	15

For the year as a whole, there prevailed a tendency for the large stores to have the greater variability in their wholesale cost prices for oranges they sell, whereas the medium- and small-sized stores exhibit about the same degree of variability in wholesale prices. These tendencies, however, did not prevail in the two halves of the year. The variabilities in the first half of the year, for all stores, reflect a marked divergence in the structure of wholesale prices of the stores when the wholesale orange price level declined somewhat during the period and then recovered erratically; the variability in the latter half of the year was influenced in large part by the upward trend in wholesale prices during the March-early June period.

It may be noted that when the wholesale price of oranges followed a persistent upward trend, as in March through early June 1948, the wholesale prices of all the stores tended to bunch together. This may indicate that, in a strengthening market, one that continues so for a relatively considerable period, the wholesale price structure tightens and the large stores do not purchase as advantageously relative to the smaller stores as compared with other market conditions. In this respect, it may also be noted that the wholesale purchase prices paid by the large stores went substantially under the prices paid by other stores after periods when

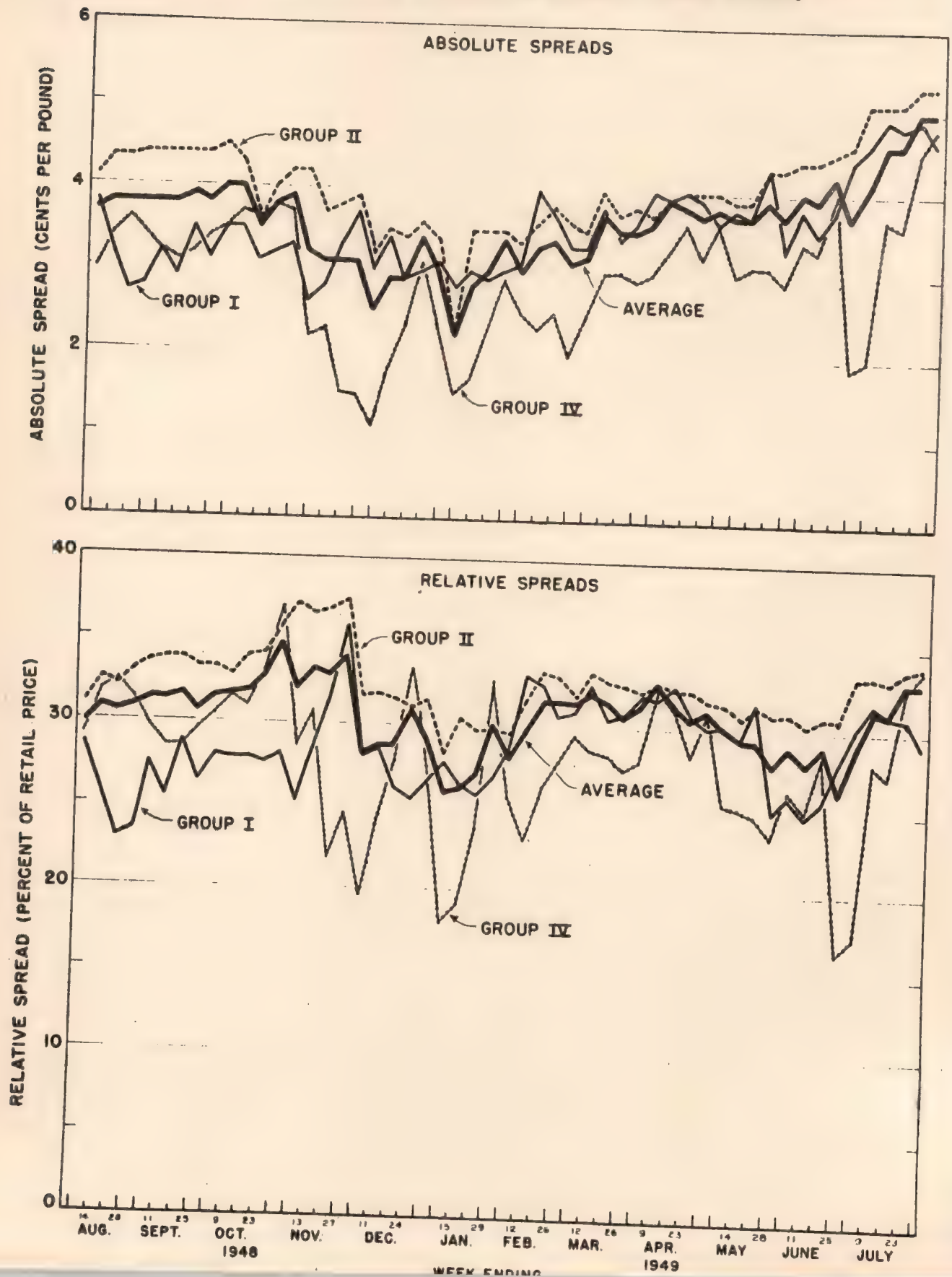
the wholesale price level was either fairly stable or in a declining phase. Thus, the marked downward sharp swings in the cost price paid by the large stores may reflect situations where orange supplies had been or were accumulating and the large volume purchasers, that is, the large stores, were in a position to command sharp reductions in wholesale prices as inducement to relieve the market of supply accumulations.

When the lower and upper panels of Figure 2 are compared, it becomes apparent that most of variation and major swings in the retail prices occur simultaneously with those in the wholesale prices, where the latter reflect the prices paid by the stores for the oranges they sold at the retail prices shown in Figure 2. This relationship generally prevails for the three groups of stores and is most strongly evident in the behavior of the wholesale and retail prices experienced by Group IV stores. Although the movement of weekly retail prices of oranges is broadly correlated with the movement of the corresponding wholesale prices, the two types of prices are not perfectly correlated. This is reflected by the behavior of the spread between the retail and wholesale prices. To account for the behavior of the retail prices of oranges, it is necessary to consider the behavior of the retail and wholesale spread as well as the behavior of the wholesale prices. At this point, we shall not be directly concerned with the question as to why the spread tends toward particular levels; we shall consider what are the major behavioristic patterns of the spread in a descriptive sense.

Absolute Spreads Between Weekly Retail and Wholesale Prices of Oranges.--The record of average weekly spreads of fresh oranges, all grades and sizes combined, is shown in Figure 3. The upper panel includes the absolute spreads, and the lower panel includes the relative spreads. As in the previous two figures, the data for the three groups of stores are charted along with the over-all average for all stores combined represented by the heavy solid line.

The absolute spreads, computed by subtracting the wholesale prices from the retail prices for the respective weeks, reflect the gross earnings of the stores in terms of cents per pound. Review of the upper panel of Figure 3 clearly shows that such earnings not only differ among the several store groups, but also varied over time for a single group of

FIGURE 3. ORANGES; SPREADS BETWEEN RETAIL AND WHOLESALE PRICES
BY STORE GROUPS, WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



stores. Review of the graphical presentation of the absolute spreads indicates that they tend to be lowest for the large stores classified in Group IV. But of some interest and unexpected in some quarters is also the indication that the absolute spread for Group II stores, the medium-sized ones, tends to average higher than for the smaller sized stores classified in Group I. Another characteristic evident from the figure is that irregular swings not only occur in the absolute spreads, but those for the large stores tend to take deeper dips than do the absolute spreads for the other stores. Thus, it is advisable to look further at the comparative levels of the absolute spreads, by store groups, as well as the variability or degree of fluctuation to which the absolute spreads are subjected.

The following summary data provide additional bases for comparing the average levels of the absolute spreads in the three groups of stores.

TABLE 5
Average Weekly Absolute Spreads Between
Retail and Wholesale Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	3.1	3.9	3.5
Group II stores	3.9	4.2	4.0
Group IV stores	2.8	3.1	2.9
All stores combined	3.4	3.8	3.6

These data indicate that the absolute margins in the large stores are less than in the other stores; this prevailed during both the first and second halves of the year. The data also indicate that the Group I stores have lower absolute margins than in the Group II stores; this also occurred the first and second halves of the year.

We may now begin to combine the information on absolute spreads and prices. This will help to account for the comparative levels of retail prices for fresh oranges in the several groups of stores. It was earlier

shown that the retail prices in the large stores tended to be lower than in the remaining stores; it was also shown earlier that the retail prices in those remaining stores, the medium- and small-sized ones, were just about equal. But, as explained above, although the wholesale prices paid by the large stores averaged less than the wholesale prices paid by the other stores, the wholesale prices paid by the medium-sized stores averaged lower than those paid by the small stores. Thus, it is clear that one of the reasons accounting for the large stores having the lowest retail prices is that such stores not only tend to buy their oranges more cheaply than the other stores, but the large stores also tend to have the smallest absolute spreads. Such smaller spreads superimposed on lower wholesale prices yield lower retail prices of oranges in the large stores.

The accumulated data on orange prices and spreads indicate that, although the small stores tend to have higher wholesale costs for the fresh oranges they sell, the small stores tend to have lower absolute margins than do the medium-sized stores. Thus, the lower margins imposed by the small stores just about offset the higher wholesale costs they incur, so that the retail prices in the small- and medium-sized stores result in being just about equal over fairly long periods such as several months. This was characteristic of both the first and second halves of the year investigated.

Why the absolute margins in the small stores tend to be lower than those in the medium-sized stores is a question to which there may be several answers. It may be that the small stores have lower cost structures, in the sense of "cost of doing business," than the medium-sized stores, although this conjecture seems unlikely. It may be that the owners of small stores have a lower opportunity cost than do the owners of the medium stores and are willing to or are forced to accept lower net earnings and still remain in business. Or it may be that the small stores compete with the medium-sized ones, due to factors such as location and type of customers, and thus the small stores accept the lower absolute margins so that they can have retail prices which about approximate those quoted in their competitive medium-sized stores. A plausible conjecture is that a mixture of the second and third reasons accounts for the lower absolute spreads found for the small stores.

When the two panels in Figure 2 are re-examined along with the upper panel of Figure 3, further aspects of the relations between prices and absolute spreads become clearer. As the wholesale price dips or advances, the absolute spread tends to do likewise. The tendency is apparent in the graphical record of the prices and absolute spreads of the three groups of stores but appears most strongly in the data for Group IV stores. When their wholesale prices declined and advanced substantially to yield the sharp breaks and subsequent recoveries clearly evident in the Group IV data, the absolute spreads for the corresponding weeks behaved similarly, resulting in the retail prices also showing similar conformations. This positive correlation between the prices and absolute spreads will be examined in more detail later, and here we only introduce the notion that the absolute spread between the retail and wholesale prices is not invariant with respect to the level of the price. This relationship exists in each of the groups of stores but in varying degrees as will subsequently be shown.

Before passing on to a review of the behavior characteristics of the relative spreads, we consider the nature of variability in the average weekly absolute spreads. Relevant data on this point are as follows:

TABLE 6
Coefficients of Variation in Average Weekly
Retail and Wholesale Absolute Spreads of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	10	13	17
Group II stores	13	14	14
Group IV stores	30	23	27
All stores combined	14	13	15

The striking feature of these data is the suggestion that the degree of variability in the absolute spreads for the Group IV or large stores is substantially more than the degrees of variabilities in the

absolute spreads for the medium-sized and small stores. This differential characteristic of relative variability being greater in the absolute spreads of the large stores is in line with similar results for the retail and wholesale prices. For them, also, it was shown the large stores have a greater degree of variability than the medium-sized or small stores. But when the degrees of variability in the absolute spreads of the medium and small stores are compared, the situation is not so clear. Rather, it is somewhat mixed, and the inference may be drawn that very little real difference exists between the degrees of variability in the absolute spreads of the small- and medium-sized stores. It may be noted that this also was the case for the variabilities of the retail and wholesale prices of oranges in the small- and medium-sized stores. Thus, with respect to structural aspects of the retail and wholesale orange prices and the spread between, the small- and medium-sized stores appear to have much in common, but the large stores stand distinctly apart with differential aspects of structural behavior in their wholesale and retail orange prices and the spread between them.

Relative Spreads Between Weekly Retail and Wholesale Prices of Oranges.---We may now turn to the relative spread defined as the absolute spread expressed as a per cent of the retail price. The record, by store groups, is pictured in the lower panel of Figure /3. There it is evident that the relative spreads differ among the store groups and that in each of the store groups the relative spread varies during the year. Over short periods of say several weeks, the movement in the relative spread is positively correlated with the movement of the prices, and over more extended periods or in terms of trend there is a negative correlation between the movements of the relative spread and the prices, but the tendency is not a marked one. As will be noted later, the relative spread is generally less correlated with the prices than is the absolute spread, although this tendency is not independent of the particular store group considered.

When the lower and upper panels of Figure 3 are compared, certain characteristics emerge. For the large stores, when the absolute spread declines sharply and then rises to produce a deep "v" picture, the relative spread does similarly. This is easily evident in the data for the Group IV stores. Since the relative spread reflects the interaction of

both the absolute spread and the retail price, the behavior characteristics of the relative spreads emerge as a mixture of the behavior patterns of the absolute spread and the retail price. To compare the relative spreads of the several groups of stores, the following data may be used and interpreted in light of similar data presented earlier for the retail prices and absolute spreads by store groups.

TABLE 7
Average Relative Spreads in
Weekly Retail Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949 July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	27	30	29
Group II stores	33	32	32
Group IV stores	29	27	28
All stores combined	31	30	30

The preceding data on average relative spreads reveal relationships which may be unsuspected in various quarters. It is common belief that large stores, such as those in Group IV, definitely have lower relative spreads than do other stores, and it is believed by some that the difference in relative spreads is a rather substantial one. But the available evidence fails to support such views. It is valid to accept the idea that the large stores have lower absolute margins as shown earlier. But with respect to relative margins, the case is not so clear. During the first half of the year investigated, the small stores experienced lower relative spreads than did the large stores, although the difference was not substantial and may not be statistically significant. During the same period, the medium-sized stores had the largest relative spreads as they did absolute margins. In the second half of the year, the large stores had the lowest relative spreads, and the medium stores again had the highest as they did with absolute spreads during the same period. For the year as a whole, the relative spreads in the small and

large stores were just about the same, a difference of only 1 per cent and one which is not statistically significant. The average relative spread experienced by the medium-sized stores was larger than for either the small or large stores. Thus, one may doubt the general notion that the larger the store the lower its relative spread.

The reasons why the small stores have average relative spreads as narrow or of about the same magnitude as those of the large stores are probably the same reasons as those noted earlier when attention was directed to the absolute margins of the three groups of stores. But equally as striking as the comparability of the relative spreads for the various sized stores is the finding that the relative margins do not differ as widely among store sizes, contrary to the belief in some quarters. The lower retail prices of oranges charged by the large stores are not due to the practice of such stores operating with a substantially reduced relative margin.

A major advantage of the large stores is their apparent ability to buy their fresh oranges cheaper than either the medium-sized or small stores. It is these lower purchase prices which put the large stores in a position to quote lower retail prices and have lower absolute spreads but still with the relative spreads not averaging lower than some other stores. Thus, in terms of returns in relation to investment in fresh citrus merchandise, as measured by the relative spread, the large stores are not in an unfavorable position. Their position, in fact, may be advantageous when consideration is given to their volume handled and rate of turnover of inventory.

The advantage in lower wholesale purchase prices held by the large stores is not a consistent one enjoyed at all times. The data suggest that only periodically, with an irregular timing, do their wholesale orange prices go strongly below wholesale prices paid by other stores. The same applies to absolute spreads. At other times, and for not inconsiderable periods, the wholesale prices paid by large stores hover close to or not much under the wholesale prices paid by medium-sized or small stores. Here, also, the same applies to absolute spreads. But when substantial numbers of weeks are considered, the wholesale prices paid by the large stores and their absolute spreads average less than those experienced by other stores. This is due in large part to the

occasional intervals when the large stores enjoy marked differentials in their wholesale prices and operate with reduced absolute spreads. This, over a period of time, accounts for the position of retail prices quoted by the large stores as compared with the other stores. In contrast with such large stores, the small stores maintain their competitive position with medium-sized stores by accepting smaller spreads, absolute and relative, than do the medium stores. The medium-sized stores, however, apparently succeed in maintaining their absolute and relative spreads above those of the small stores as well as the large stores.

Relations of Weekly Spreads to Prices of Oranges.--The relationships between the weekly absolute spreads and the weekly retail and wholesale prices of fresh oranges are further examined by considering in greater detail the correlations between the spread and prices. In Figure 4 are presented the scattergrams of the absolute spread and the retail price for each of the store groups and for all stores combined. The small circles indicate, for a given week in the first half of the year studied, the coordinate position of the absolute spread in that week and the corresponding retail price. The small crosses indicate similar coordinate positions for weeks in the second half of the year. The heavy solid line represents the regression of the weekly absolute spread on the average weekly retail price of fresh oranges over the entire year being considered.

The panels in Figure 4 clearly emphasize the positive correlation between the absolute spread and the retail price, a fact which was also brought out earlier by previous charts and analyses. But Figure 4 further emphasizes that the correlation is not a perfect one, and the degree of correlation appears to differ among the several groups of stores. We may, therefore, look into that question more closely. One way is to examine the correlation coefficients presented in the following table where the relations are given for each half of the year separately as well as for the year in its entirety.

FIGURE 4. ORANGES; RELATION BETWEEN RETAIL-WHOLESALE PRICE
SPREAD AND RETAIL PRICE, BY STORE GROUPS
WEEKLY, AUG. 2, 1948 TO JULY 30, 1949

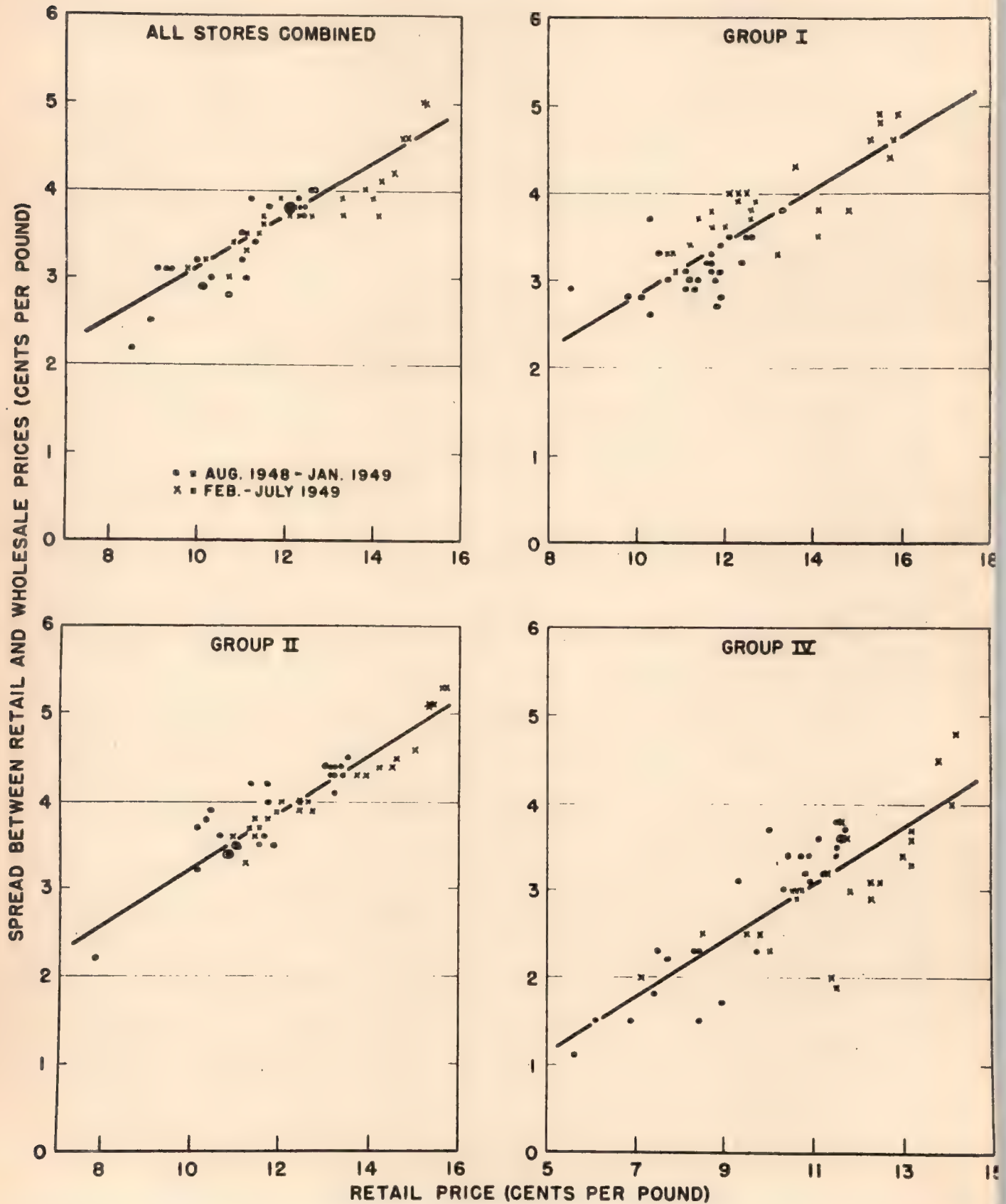


TABLE 8
Coefficients of Correlation Between Weekly
Absolute Spreads and Retail Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
Group I stores	+0.51	+0.82	+0.82
Group II stores	+0.87	+0.96	+0.92
Group IV stores	+0.91	+0.76	+0.83
All stores combined	+0.89	+0.89	+0.91

It is evident that no consistent pattern emerges. During the first half of the year, the correlation was lowest for the small stores and highest for the large stores; but in the second half of the year, the medium-sized stores experienced the highest correlation with the large stores having the lowest. When the data for the entire year are pooled together, the medium-sized stores have the highest correlations, with the small and large stores having equal correlation between the absolute spread and retail price. The particular time period considered and the behavior and structure of the prices during that period, as well as its length, affect the correlation results. But as a broad general tendency, there is a significant positive correlation between the absolute spread and the retail price of oranges. As will be noted later, such relationship does not generally prevail when the relative spread is considered.

Additional light is cast on the relation of the weekly absolute spread to the weekly retail price by considering the following regression^{1/} equations which are numerical expressions of the heavy solid lines in the four panels of Figure 4:

^{1/} The subtraction of the regression coefficients in Table 9 from 1 gives the values of the coefficients of regression of the corresponding weekly wholesale price on the weekly retail price; and the t-ratios of the regression coefficients are in the following relation: $\frac{t_1}{t_2} = \frac{b_1}{b_2}$.

TABLE 9
Equations of Linear Regression of Weekly
Absolute Spreads on Retail Prices of Oranges
August 1948-July 1949

Store group	Constant	Regression coefficient
Group I stores	-0.21 (0.58) ^{a/}	+ 0.30 (10.32)
Group II stores	0.09 (0.37)	+ 0.32 (17.05)
Group IV stores	-0.51 (1.52)	+ 0.33 (10.45)
All stores combined	+0.06 (0.26)	+ 0.30 (15.32)

^{a/} Figures in parentheses are t-ratios.

From a view of probability sampling, the constant terms in the above table may not be considered as statistically significant, whereas each of the regression coefficients may be considered as highly significant in a statistical sense. If such a view is accepted, the inference may be drawn that, aside from sampling variation, the true regression line passes through the origin of the absolute spread and retail price axes. In such a case, the regression equation is interpreted in the following terms. The absolute spread tends to bear a constant percentage relation to retail price, and the regression coefficient indicates the particular percentage relationship. With this interpretation, the regression coefficient for all stores combined indicates a relative spread of 30 per cent of the retail price. This result coincides with that noted earlier in the discussion of the relations indicated by Figures 1 and 3. There it was noted that the 30 per cent is a yearly average around which fluctuated the relative spreads for the individual weeks. Such fluctuation is reflected in Figure 4 by the scatter of the individual weekly points around the regression line for all stores combined.

When the above regression equations are examined, the inference may be drawn that, in each of the store groups, the absolute spreads tend to bear a constant percentage relationship to the respective retail prices.

The average relative spreads for the individual store groups, as derived from their regression coefficients, do not correspond precisely to the average relative spreads noted earlier, but the discrepancies are relatively minor except for the Group IV stores. The procedures of averaging, a simple mean as compared with the slope of a least-squares regression line, account for some of the discrepancy.

In Figure 5 are given scattergrams of the weekly absolute spreads and the weekly wholesale prices. The scattergrams are constructed and identified in the same manner as Figure 4, except the wholesale price is used in Figure 5 in place of the retail price used in Figure 4. The heavy solid regression lines in Figure 5 pertain to the average relation over the entire year investigated.

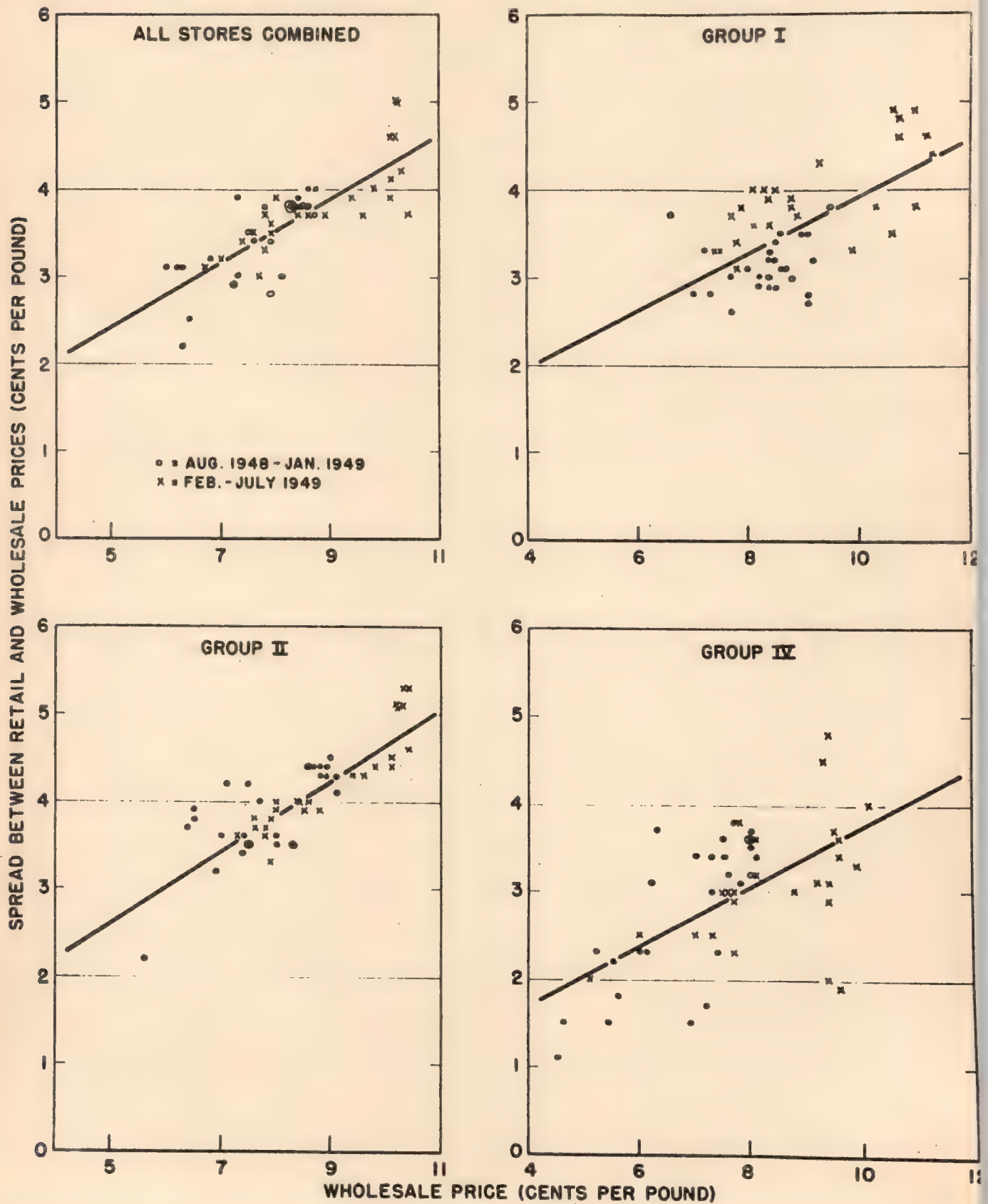
Inspection of Figure 5 immediately suggests the existence of a positive correlation between the weekly absolute spread and the corresponding weekly wholesale price. The respective correlations are as follows:

TABLE 10
Coefficients of Correlation Between Weekly
Absolute Spreads and Wholesale Prices of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
Group I stores	+0.16	+0.67	+0.63
Group II stores	+0.71	+0.91	+0.83
Group IV stores	+0.75	+0.45	+0.61
All stores combined	+0.75	+0.80	+0.81

The immediately preceding correlation coefficients indicate a general tendency of the weekly absolute spread to be positively correlated with the wholesale price. The strength of the tendency varies among the three store groups and over time for a single group of stores. As in the correlations of the absolute spread with the retail price, no consistent pattern emerges from the above table. In the first half of the year, Group IV has the highest correlation between the weekly absolute spread and the wholesale price; and for Group I not only is the correlation the

FIGURE 5. ORANGES; RELATION BETWEEN RETAIL-WHOLESALE PRICE SPREAD AND WHOLESALE PRICE, BY STORE GROUPS
WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



lowest, it is also insignificant. In contrast, during the second half of the year, the Group II stores show the highest correlation, with the Group IV stores the lowest. When the data for the entire year are pooled, Group II has the highest correlation between its weekly absolute spread and its weekly wholesale price; and Groups I and IV both have lower correlations which are not significantly different from each other.

When the set of correlations in the above table is compared with the set in the preceding table, one finds that the general pattern in one is similar to that in the other. But it is evident that the correlations in the latter set are lower than the corresponding ones in the former set. There appears a pronounced general tendency in each group of stores, and also in each half of the year, for the absolute spread to be more closely related--in a correlation sense--to the retail price than to the wholesale price.

A pertinent question is whether, because of business practices, the absolute spread is more closely related to the retail price than to the wholesale price. Do merchants set their retail prices with a view toward reaching or maintaining a particular relation between the absolute retail and wholesale spread and the retail price? Or do the merchants attempt to attain a particular relation between the absolute retail and wholesale spread and the wholesale price? Corresponding questions may be asked with respect to the relative spread and the prices. These and similar questions are discussed at some length later, but so far it is reasonably clear that the various sized stores do not apparently behave similarly. It is also not clear that a given group of stores behaves consistently the same way over a long period of time. At this point, however, we must consider further evidence.

Some further evidence is available from the coefficients of regression of the weekly absolute spreads on the weekly wholesale prices in the following table:^{1/}

^{1/} The addition of 1 to the regression coefficients in Table 11 gives the corresponding coefficients of regression of the weekly retail price on the weekly wholesale price; and the t-ratios of the regression coefficients bear the following relation to the t-values in Table 11:

$$\frac{t_1}{t_2} = \frac{b_1}{b_2} .$$

TABLE 11
Equations of Linear Regression of Weekly
Absolute Spreads on Wholesale Prices of Oranges
August 1948-July 1949

Store group	Constant	Regression coefficient
Group I stores	+0.73 (1.48) ^{a/}	+ 0.32 (5.71)
Group II stores	+0.57 (1.74)	+ 0.41 (10.70)
Group IV stores	+0.35 (0.72)	+ 0.34 (5.35)
All stores combined	+0.53 (1.66)	+ 0.37 (9.75)

^{a/} Figures in parentheses are t-ratios.

The constant terms in the above linear regression equations, for each of the store groups, are not statistically significant in a probability sense, so there is a basis for the inference that, aside from sampling variations, the regression lines pass through origin or the intersection of the axes for the absolute spread and the wholesale price. With such an interpretation, there is a tendency for the absolute spread to bear a constant percentage relationship to the wholesale price. This type of situation appears to be more pronounced for the Group IV stores than the other two groups of stores. Thus, again, the absolute spread of the large stores appears to have characteristics different from those of other stores.

If the regression coefficients are viewed in a descriptive sense, they indicate that, as the weekly wholesale price changes 1 cent per pound, the absolute spread changes in the same direction by the following average amounts in cents per pound: 0.3 cent for Group I stores; 0.4 cent for Group II stores; and 0.3 cent for Group IV stores. Here, as in the regressions of the absolute spread on retail price, the changes in the weekly spread for a given change in the wholesale prices are remarkably similar in amount for the three groups of stores. This similarity among store groups prevails much less during shorter periods such as a single month or even six months than during a period of as long as a year.

In review of the correlation and regression results pertaining to the spread and the prices, the discussion so far has been limited to the weekly absolute spread. The question arises as to how is the relative spread correlated with the prices. This question was investigated also, and the results are presented in Tables 12 and 13. The correlations and regressions are generally so low, and statistically insignificant, to the extent that meaningful quantitative generalizations could not be made. Yet, some comments should be made here since even the lack of systematic relations can be suggestive as to what does not characterize the relations.

In general and to the extent any relationship does exist between the relative spread and the retail price, it is reflected by a positive correlation for the small and large stores and negative correlation for the medium stores as well as all stores combined. The degrees of correlation, however, are so weak that they cannot be taken seriously as a basis for inferring a real negative or positive relationship existing. Not only is the negative correlation very weak, but the scatter of the individual weeks is very wide. This is so when the data for all stores are combined, but the situation is not much different when the individual groups of stores are considered.

For Group I stores taken alone, the relative spread tends to vary independently of the level of the retail price. The coefficient of regression of the relative spread on the retail price approaches zero and is not significantly different from it. In the Group II stores, the regression is also statistically weak, and it is even less pronounced than for the other two groups of stores. The strongest relationship between the relative spread and the retail price appears in the data for Group IV stores. Thus, the weekly relative spread and the weekly average retail price tend to vary independently of each other as far as is evident from the data available.

When attention is turned to the weekly wholesale price and the relationship between it and the weekly relative spread for all stores combined, we find again a low correlation. For the Group I stores, the correlation that is noticeable is of a very weak magnitude with the regression also being insignificantly different from zero. For the Group II stores, a negative relationship is again noticeable but still is of

TABLE 12
Correlation and Regression Relations Between Weekly
Relative Spreads and Weekly Retail Prices of Oranges
August 1948-July 1949

Store group	Correlation coefficient	Equation of regression of weekly relative spread on weekly retail price	
		Constant	Regression coefficient
		per cent of retail price	
Group I stores	+0.06	27.48 (9.07) ^{a/}	+0.10 (0.40)
Group II stores	-0.04	33.04 (16.08)	-0.04 (0.25)
Group IV stores	+0.28	21.22 (6.66)	+0.61 (2.05)
All stores combined	-0.02	30.86 (15.17)	-0.03 (0.17)

^{a/} Figures in parentheses are t-ratios.

TABLE 13
Correlation and Regression Relations Between Weekly
Relative Spreads and Weekly Wholesale Prices of Oranges
August 1948-July 1949

Store group	Correlation coefficient	Equation of regression of weekly relative spread on weekly wholesale price	
		Constant	Regression coefficient
		per cent of retail price	
Group I stores	-0.24	33.49 (11.55) ^{a/}	-0.55 (1.68)
Group II stores	-0.22	35.64 (18.29)	-0.37 (1.62)
Group IV stores	-0.03	28.35 (8.40)	-0.09 (0.22)
All stores combined	-0.21	33.49 (17.30)	-0.36 (1.55)

^{a/} Figures in parentheses are t-ratios.

doubtful significance. Group IV stores again reflect no significant relationship between the weekly relative spread and the wholesale price.

The lack of any systematic relationships between the relative spread and the prices is in contrast with the situation discussed above for the relationships between the absolute spread and the prices. There is, therefore, the question why in terms of time series no systematic tendency toward significant correlation and regression is found between the relative spread and either the retail or wholesale price. One obvious conjecture is that the stores do not follow a pricing practice of having their relative spread bear a definite relation to the prices. Or it may be that, if experience covering a period longer than a year is considered, some general pattern would be discernible, but that appears doubtful in view of the information available now. Or it may be that, if data for months are considered, meaningful correlations and regressions between the relative spread and the prices would be uncovered. Or it may be that, when a more comprehensive or sophisticated analysis is made, an indirect relationship will be discovered between the relative spread and the prices. This view and the first conjecture mentioned presently appear to be the more promising. But at this stage of the investigation, we can say that no apparent systematic relationship is discernible between the relative spread and the prices. Stores, in general, do not appear to follow a pricing practice that results in their relative spread being obviously and markedly related to the prices the stores pay or receive for the oranges they sell. Such a view, of course, can be only a preliminary generalization at this stage of the investigation.

Relations of Weekly Spreads to Retail Sales of Oranges.--The discussion so far has dealt with the retail and wholesale prices, their spread, and relationships between them. We may now turn to the relations of the spread to the volume of oranges sold by the stores. Although volumes of retail sales were indirectly reflected in the previous analyses, since the prices are not independent of the volumes and since the three groups of stores in effect reflect different levels of retail volumes, now we can consider in explicit terms the relations of the weekly spread to volumes sold weekly in each of the store groups as well as all stores combined. Again, the absolute spread and then the relative spread are considered in turn.

In Figure 6 are pictured the scattergrams of the weekly absolute spread and the corresponding volume of retail sales. The upper left panel includes the data for all stores combined, and the other three panels include the data for the respective store groups as indicated. The vertical axis represents the weekly absolute spread, and the horizontal axis represents the weekly retail sales volume. The weeks in the first half of the year are distinguished from those in the second half. In the scattergrams the position of a single week is determined by its absolute spread and its corresponding volume of retail sales.

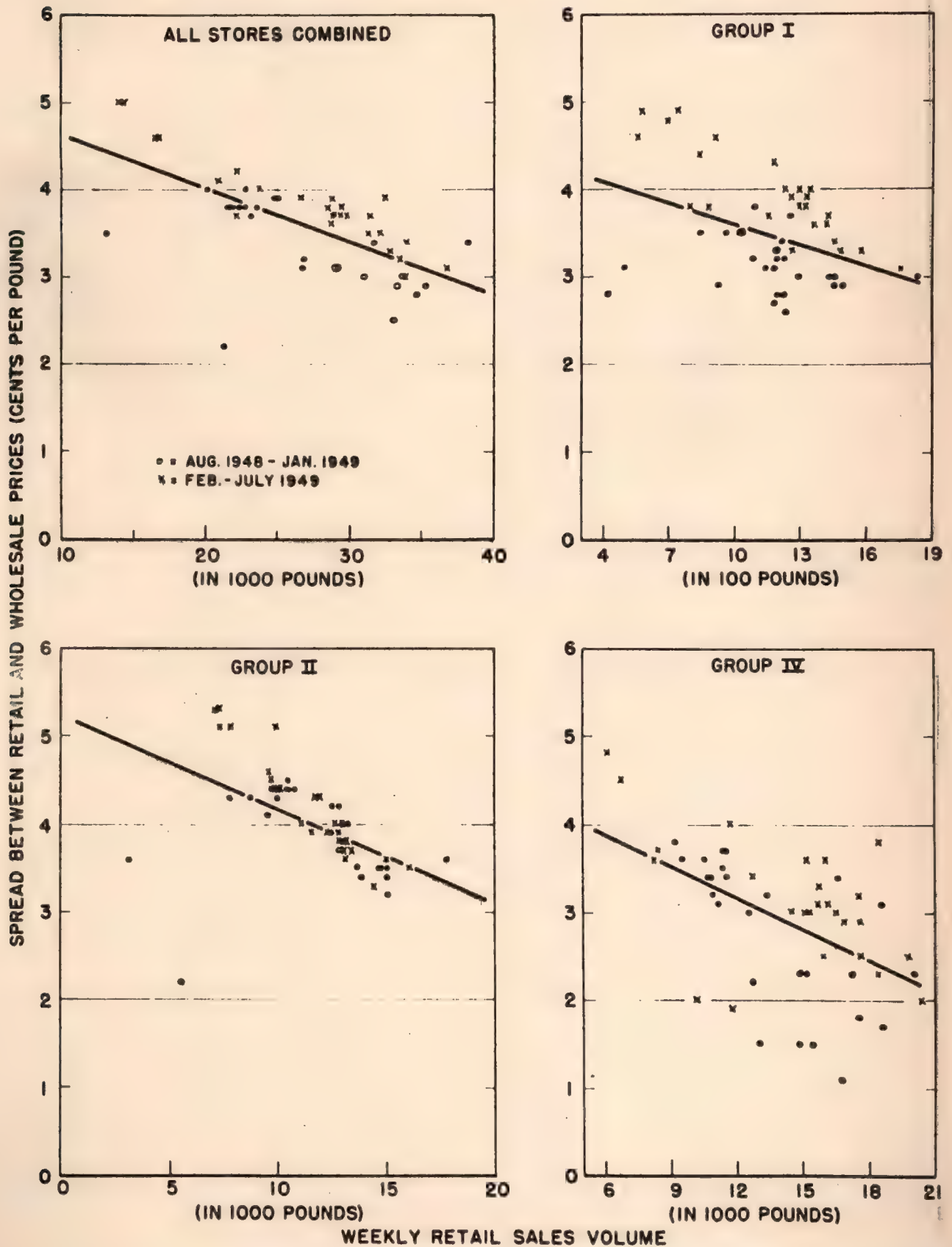
Examination of Figure 6 immediately results in the suggestion that some negative correlation exists between the weekly spreads and the volumes of weekly retail sales of fresh oranges. Although each of the panels shows that the relationship is subject to exceptions, the tendency toward a negative correlation is easily noticeable. The extent to which the correlation prevails is indicated by the following coefficients:

TABLE 14
Coefficients of Correlation Between Weekly
Absolute Spreads and Retail Sales Volume of Oranges
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
Group I stores	-0.55	-0.93	-0.66
Group II stores	-0.10	-0.83	-0.40
Group IV stores	-0.14	-0.94	-0.48
All stores combined	-0.65	-0.55	-0.54

It is clear from these statistics that the correlation in the latter half of the year is much more pronounced, for each of the store groups, than in the first half of the year. It may be recalled that during the first half of the year the retail volume first varied horizontally then trended up to a plateau, while the absolute spread at first also varied horizontally then trended down to a brief plateau. During the second half of the year, the weekly volume trended down, at first gradually then more sharply, while the weekly absolute spread trended up gradually

FIGURE 6. ORANGES; RELATION BETWEEN RETAIL-WHOLESALE PRICE SPREAD AND VOLUME OF RETAIL SALES, BY STORE GROUPS WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



and closed the year with a marked rise during the last month. Such differential behavior over time is reflected in the differing correlations for the first and second halves of the year in each of the store groups.

During the first half of the year, only Group I stores in the aggregate had any significant correlation between the weekly absolute spread and the weekly volume. But during the second half of the year, all three groups of stores had high and significant correlations, with those of Groups I and IV being about the same degree and each somewhat above that of Group II stores. When the year as a whole is considered, Group II again had the weakest relationship between the weekly absolute spread and the retail sales volume, but the relationship for Group I stores was considerably above that for the Group IV stores.

The regression relations of the weekly absolute spread to the weekly sales volume are summarized as follows:

TABLE 15
Equations of Linear Regression of Weekly
Absolute Spreads on Retail Sales Volume of Oranges^{a/}
August 1948-July 1949

Store group	Constant	Regression coefficient
Group I stores	+ 4.423 (14.915) ^{b/}	-0.078 (3.131)
Group II stores	+ 5.162 (17.697)	-0.010 (3.978)
Group IV stores	+ 4.668 (12.123)	-0.012 (4.626)
All stores combined	+ 5.194 (18.703)	-0.006 (5.891)

^{a/} Absolute spread in cents per pound, and volume in units of 100 pounds.

^{b/} Figures in parentheses are t-ratios.

Although the regressions for the year as a whole are significant in a statistical sense, they appear to be of a minor magnitude especially for the Groups II and IV. It may be noted, however, that the regression for Group I is substantially greater than for the other two groups of stores. Thus, the absolute spread in the small stores appears to be more sensitive

with respect to variations in the volume handled and sold than does the absolute spread in either the medium-sized or large stores. Such sensitivity may be expected in the small stores, but it also may be surprising that the absolute spread does not react that way in the medium-sized and large stores. It might be thought, perhaps, that such would be the situation for the relative spread as related to the retail sales volume.

Investigation was also made into the relations of the weekly relative spread to the weekly retail sales volume. This was done for the respective groups of stores as well as for all stores combined. Very close to zero correlations appeared for each of the store groups, and the regressions also were insignificant except perhaps for Group IV which had a slight tendency toward a negative regression of the relative spread on the retail sales volume. But it is reasonably clear that the absolute spread, for each of the store groups, is more closely related to the retail sales volume than is the relative spread.

Interpretation of the above results in terms of pricing policies and practices of the stores is deferred until the last section of the report. To provide additional background for such interpretation, we next turn to examination of the findings for lemons in the following section.

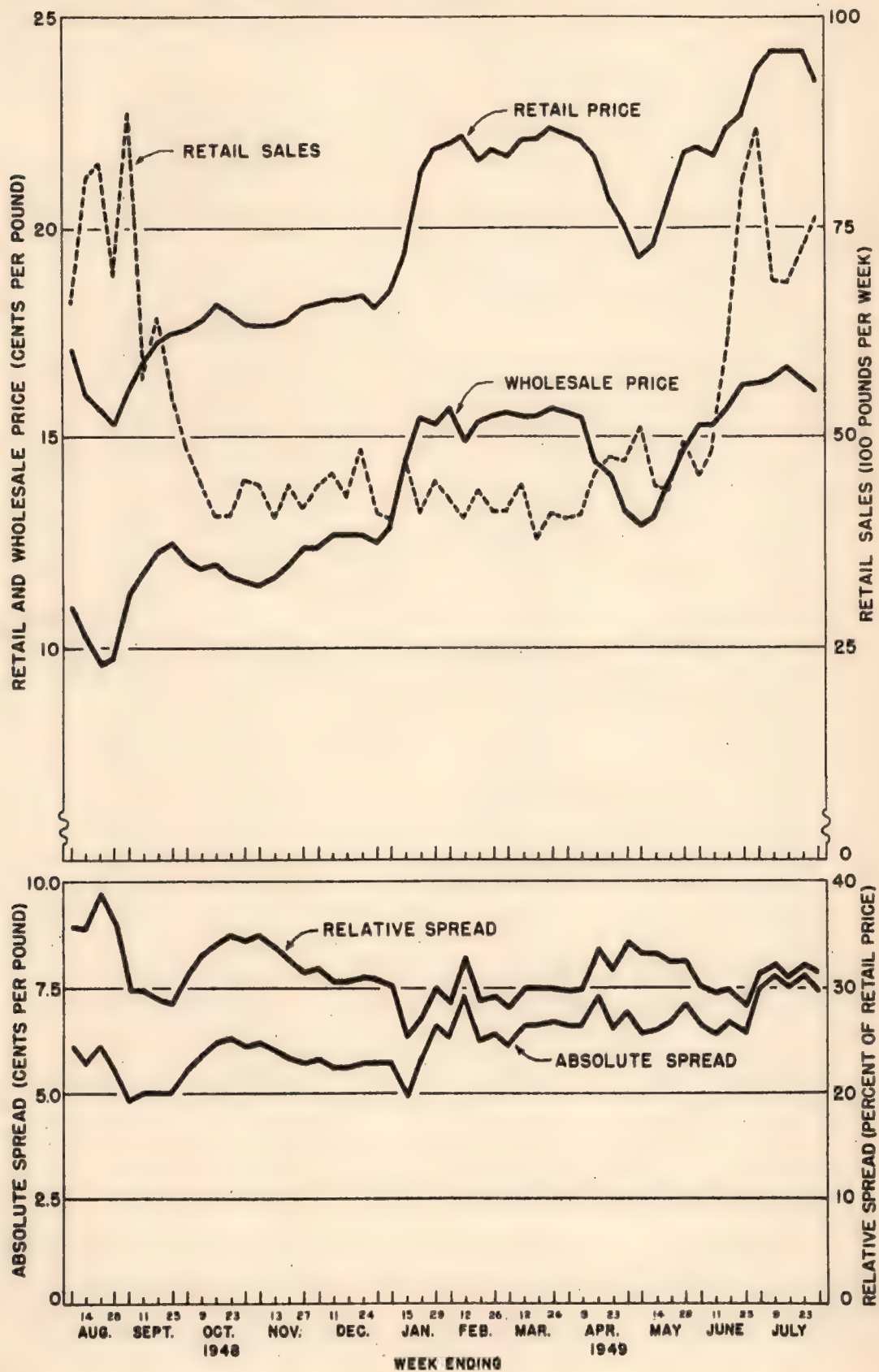
LEMONS: WEEKLY PRICES AND RETAIL MARGINS

Fresh lemons are a specialty agricultural product. They have wide distribution among retail outlets but are not purchased and sold by stores in as large volumes as, say, oranges. Fresh lemons are bought for a variety of uses by consumers, including the homemaking of fresh juice-flavored drinks, garnishes, and the flavoring of purchased as well as home-prepared foods. Except for occasions such as dealing with respiratory difficulties in the cold winter months or alleviating heat effects in the hot summer periods, households generally purchase fresh lemons in small numbers. Despite their relatively good-keeping qualities, lemons are not bought and held in volume by consumers because the wide distribution and year-round availability of the fruit make them easily and readily purchasable at most food outlets and also because of the specialized use for which lemons are purchased by consumers.

Fresh lemons are a citrus fruit, but they compete less than oranges or grapefruit do in consumption with other fresh fruits including other citrus and deciduous fruits. For juice purposes, fresh lemons in recent years have been faced with an expanding market for canned lemon concentrate and natural juice as well as canned frozen lemonade concentrate. This development in lemons is in common with a similar one in oranges. But lemons differ greatly from oranges or grapefruit in that lemon sales are sensitive to extreme fluctuations in the temperature.

In Figure 7, the upper panel, are shown the weekly retail sales of fresh lemons experienced by the stores in the sample for the period from August 1948 and ending at the close of July 1949. The seasonal pattern of retail sales that year is generally characteristic of the seasonal flow of fresh lemons from packing houses to consumers. The summer months usually have larger sales than the winter months. But within the seasons, the occurrence of peaks in retail sales is highly correlated with extreme changes in the temperature. For example, the peaks in retail sales at the beginning of September 1948 and at the end of June 1949 are evidence of unusually hot seasonal weather in those weeks during which relatively large quantities of fresh lemons were purchased by households to make fresh lemonade and other fresh lemon juice drinks. In the winter

FIGURE 7. LEMONS; RETAIL AND WHOLESALE PRICES, RETAIL SALES,
AND SPREAD BETWEEN RETAIL AND WHOLESALE PRICES
WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



months of the year being reviewed, no unusually high peaks in retail sales are evident from the record. This indicates that no significant period of unusually cold weather with many cases of respiratory difficulties occurred that winter. During the November 1948-April 1949 winter season, retail sales of fresh lemons in Denver fluctuated around a level trend from which there were no highly marked divergencies. Retail sales fluctuated from week to week but only to the extent that is usual in the course of the season.

Weekly Wholesale and Retail Prices of Lemons.--The retail prices pictured in Figure 7 are weekly averages, constructed from daily prices weighted by the daily volumes of retail sales, and reflect the combined experience of all of the stores in the sample. During the year, the retail price of fresh lemons in Denver followed a pronounced upward trend with a hump during the first quarter of 1949, followed by a sharp advance which was broken only at the end of the year. The higher level of the trend line and weekly prices during the second half of the year, as compared with the first half, reflects the freeze in the California lemon-producing areas in January 1949. The sharp advance in retail prices during May-July 1949, however, reflects increased consumer demand in response to usually warm seasonal weather as also evidenced in the temporary peak in retail sales at the end of June and early July 1949.

The wholesale prices also shown in Figure 7 are weekly averages and are constructed so as to measure the wholesale cost to the stores of the fresh lemons they sold in the respective weeks. Thus, the wholesale price in a given week indicates the average price paid by the stores for the fresh lemons the stores sold in that week and for which they received the average retail price indicated for that same week. Such weekly wholesale prices permit direct comparison of the prices the stores paid for the lemons they sold in given weeks with the retail prices the stores received for those same lemons. This type of wholesale price is used and referred to throughout this section on fresh lemons as was done in the previous section dealing with fresh oranges.

The weekly average wholesale prices in Figure 7 display about the same broad conformation over time as the weekly average retail prices. The major advances and declines, peaks and valleys, correspond in timing. The higher level of wholesale prices in the second half of the year, as

compared with the first half, reflects the influence of the January 1949 freeze in California noted earlier. The peak in wholesale prices near the end of the year reflects the increased retail demand and sales in those weeks also noted earlier. From the upper panel of Figure 7, a striking similarity is evident in the courses of the weekly wholesale and retail prices.

But the weekly wholesale and retail prices of fresh lemons in Denver, during the year investigated, did not behave exactly the same over time. The absolute spread given in the lower panel of Figure 1 represents the difference between the weekly retail and wholesale prices given in the upper panel. The absolute spread for a given week is derived by subtracting the wholesale price for that week from the retail price of the same week. Thus, the absolute spread measures the average return to the stores, in cents per pound, above the cost to them for the fresh lemons they sold in the respective weeks. From the return measured by the absolute spread, the stores must subtract their costs other than that for the lemons to arrive at what may be called their net earnings.

Inspection of the lower panel of Figure 7 indicates that the weekly absolute spread tended to follow an upward trend during the year investigated as did the weekly wholesale and retail prices. During some periods of several weeks, the absolute spread changed the same way as did the prices, but during other brief periods the behavior of the absolute spread appears to be independent of the behavior of the individual series of prices. Thus, from Figure 7 can be made only the broad generalization that the longer term trends (at least several months) in the absolute spread and in the weekly prices tend to move in the same direction. Within briefer periods, the situation is of a mixed nature.

During the year being reviewed, the absolute spread varied from a low of slightly less than 5 cents per pound to slightly over 7.5 cents a pound, with the low occurring near the beginning of the year and the high near the end, but also with two extremes, almost as marked as the high and low, occurring within a six-week period at about the middle of the year. Thus, the absolute spread between the weekly retail and wholesale prices of fresh lemons is subject to short-run fluctuations as well as long-term trends.

The weekly relative spreads also pictured in the lower panel of Figure 7 are constructed by expressing the absolute spread as a percentage of the corresponding weekly retail prices shown in the upper panel of Figure 7. The relative spread measures the interaction of the absolute spread with the prices from which it is derived. It is evident from the lower panel in Figure 7 that, although the weekly relative and absolute spreads have much common behavior, they also have distinguishing characteristics.

The average relative spread for fresh lemons displays a strong tendency to regress, over time, to a level of about 30 per cent. This is the same over-all broad average, it may be recalled, that was found for fresh oranges. But the relative spread in fresh lemons also departs significantly at times from the average of 30 per cent. Such departures occurred in both halves of the year but were more pronounced in the first half.

In terms of general behavior during the year studied, the relative spread fluctuated about a horizontal level. This was in contrast with the absolute trend which followed a rising trend. But over shorter periods, such as during a month or two, the weekly relative and absolute spreads generally behaved similarly with a tendency toward coinciding humps and valleys. If the trend were removed from the weekly absolute spread, the resultant series would appear very similar in conformation to the weekly relative spread series. This was also characteristic of the spreads in fresh oranges but is even more pronounced in the case of the weekly spreads for fresh lemons.

Behavior of Weekly Retail Prices of Lemons.---In reviewing the trends in the weekly retail and wholesale prices of fresh lemons and the spread between them, we have so far noted broad tendencies based on the average experience of all the stores combined. To obtain a more detailed and meaningful account of price and spread behavior, we now look at the experience of the separate store groups. We may thus note the extent to which the behavior of the separate store groups coincides with and diverges from the broad average of all stores combined. As in the previous section on fresh orange prices and spreads, the small stores in the sample are classified into Group I, the medium-sized stores in Group II, and the large stores in Group IV.

The average weekly retail lemon prices of the three groups are plotted in the upper panel of Figure 8. Immediately noticeable is the fact that each of the three groups of stores experienced an upward trend in retail prices during the year. But divergencies existed among the retail prices of the several groups of stores. During the first half of the year, Group I weekly retail prices followed the general trend exhibited by the other stores, but the prices in the large stores were at a lower level. As the end of the calendar year 1948 approached, the retail prices in the large stores tended to come nearer to the prices in the other stores. During the middle third of the year, the retail prices in all three groups of stores approximated each other very closely. In the last third of the year, however, the retail prices of Group I stores again went below, especially during March, April, and most of May 1948, but then recovered only to depart again near the end of the year.

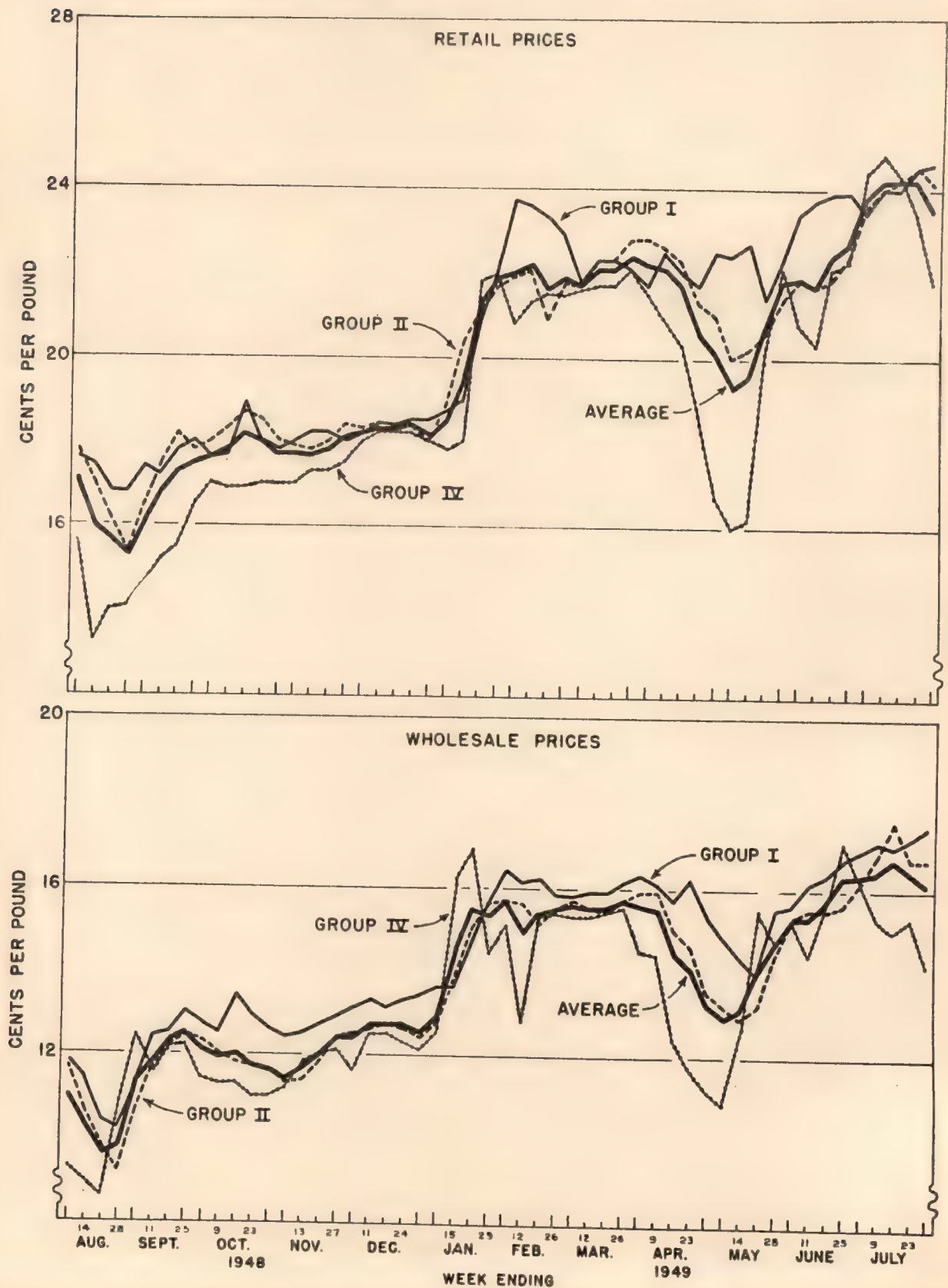
During the first half of the year, weekly retail prices in Groups I and II generally stayed close together, except in the first month when Group II prices temporarily dropped more sharply than Group I retail prices. In the middle of the year, in January and February 1949, weekly prices for fresh lemons in Group I stores bulged away from the prices in the other stores; and in the last third of the year, Group I prices did not have short-run peaks and valleys coinciding with the remaining stores. Particularly in April-May and part of June 1949, did the retail price behavior in Group I stores differ markedly from that of the other two groups of stores.

The differential levels in the average weekly prices of fresh lemons, in the three groups of stores, are suggested by the following data:

TABLE 16
Average Weekly Retail Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	18.2	22.9	20.6
Group II stores	18.2	22.2	20.2
Group IV stores	17.0	21.1	19.1
All stores combined	17.9	22.0	20.0

FIGURE 8. LEMONS; RETAIL AND WHOLESALE PRICES, BY STORE GROUPS
WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



These data indicate that the retail prices in the small- and medium-sized stores averaged the same during the first half of the year. During the same period, the retail prices for fresh lemons averaged lower in the Group IV large stores than in the other two groups of stores but only by 1.2 cents per pound. In the second half of the year, however, the weekly prices in the small stores averaged above those in the medium-sized stores which, in turn, averaged above those in the large stores. The same situation prevailed for the year as a whole. But the price differences among the store groups, over the longer periods, were not marked and from the view of sampling variation may not even be statistically significant. To find a marked difference in average retail weekly prices among the three groups, it is necessary to compare Groups I and IV, and there the difference amounts to 1.5 cents per pound, for the year as a whole, or about 8 per cent of the average price in Group I. In the second half of the year, without the very substantial drop in retail prices in Group I during March and April, the average for Group I stores would be about the same as the Group II average and only slightly under the Group I average. During the first half of the year, however, the Group IV weekly retail prices averaged lower most of the time than the weekly retail prices in Groups I and II stores.

To examine the structure of the weekly retail prices, it is necessary to look at variability in the prices. This has been done, and the summary results are given by the following quantitative measures:

TABLE 17
Coefficients of Variation in
Average Weekly Retail Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	6	4	12
Group II stores	7	5	11
Group IV stores	12	10	15
All stores combined	8	6	13

These statistics indicate that the variability in the weekly retail prices of fresh lemons is more pronounced in the large stores than in the other stores, and this occurred in both the first and second halves of the year. The average variabilities in the weekly retail prices are just about the same in the small- and medium-sized stores, and again this is characteristic of both halves of the year studied. To look more closely at some of the forces underlying these behavior characteristics of the retail prices, we consider the wholesale prices paid by the stores for the fresh lemons they sold at the retail price discussed above.

Behavior of Weekly Wholesale Prices of Lemons.--In the lower panel of Figure 8 are shown the weekly wholesale prices paid by the several store groups for the fresh lemons they sold at the retail prices during the indicated weeks. A quick look at the picture of weekly wholesale prices finds both similarities and dissimilarities with the picture of weekly retail prices in the upper panel.

During most of the first half of the year, the wholesale cost of fresh lemons to the small stores exceeded that of the medium-sized and large stores. But during two brief periods, both at times during which prices were advancing sharply, the wholesale price to Group IV stores was higher than to the Groups I and II stores, but such cases were exceptional rather than general. In the latter half of the year, Group I stores almost consistently experienced the highest wholesale cost for their fresh lemons; exceptions occurred during only three weeks--two when the large stores paid the highest price and one when the medium-sized stores had that position. The Group IV or large stores generally experienced the lowest wholesale prices during the latter half of the year, and this was even more accentuated during the period of declining prices in March, April, and early May of 1949. In that development, the large stores experienced the decline several weeks earlier than the other stores as well as a more pronounced decline. But as prices recovered, those paid by the large stores joined the levels paid by the other stores until the end of the year when the wholesale prices paid by the large stores declined sharply while those of the small continued to advance and those of the medium-sized stores rose and then declined slightly. It is clear that over short intervals, such as several weeks or a month or two,

the wholesale prices paid by the three groups of stores varied and at times did so substantially.

The comparative average levels of the wholesale prices paid by the three groups of stores for the fresh lemons they sold during the year are indicated as follows:

TABLE 18
Average Weekly Wholesale Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
	cents per pound		
Group I stores	12.7	16.0	14.4
Group II stores	12.1	15.3	13.7
Group IV stores	11.9	14.5	13.2
All stores combined	12.2	15.2	13.7

These data clearly indicate the extent to which the wholesale prices in the latter half of the year were at a higher level than prevailed during the first half. In both halves of the year, the small stores usually experienced the highest wholesale prices, and the large stores usually experienced the lowest prices. The exceptions were noted earlier, but the general relations are reasonably clear. It is also clear that the differences among the wholesale prices are not substantial and may even be sufficiently small so they are not statistically significant. Yet, the tendency, even though slight, does prevail. It depends mainly upon the ability of the larger stores to purchase their lemons more cheaply, not always, but at what apparently are strategic periods such as when the prices are declining. This applies particularly to the Group IV large stores.

When the upper and lower panels of Figure 8 are compared, one obtains preliminary indications of the relations between the weekly retail and wholesale prices. The major swings in the retail prices tend to be positively correlated with the simultaneous major swings in the wholesale prices. This suggests that the stores tend to change their retail prices as they have to pay varying wholesale prices for the fresh lemons they

sell. But there are exceptions as in the second week of February 1949. Then, the large stores had a marked dip in their wholesale price, but they maintained their retail price for fresh lemons. In the middle of January 1949, the wholesale price paid by the large stores advanced sharply, but the retail price during the same weeks declined slightly.

To compare the variabilities of the weekly wholesale prices in the three groups of stores, the following coefficients of variation were computed:

TABLE 19
Coefficients of Variation in Average
Weekly Wholesale Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
	per cent		
Group I stores	9	5	13
Group II stores	11	7	15
Group IV stores	15	10	16
All stores combined	11	7	14

The above data indicate that, for each of the store groups, the relative variability in the wholesale price was somewhat larger in the first half of the year than in the second half. In this respect, it may be recalled that the price level was lower during the first half of the year and during that time tended to rise more than during the second half of the year. But in both halves of the year, the relative variabilities increase as they progress from the small-, to the medium-, and then to the large-sized stores. This type of relationship is more pronounced in the wholesale prices than in the retail prices. There, the weekly retail prices for the large stores showed the highest relative variability, but the measures for the small- and medium-sized stores were of about the same magnitude.

Absolute Spreads Between Weekly Retail and Wholesale Prices of Lemons.—To look more closely at the similarities and differences in the behavior of the weekly retail and wholesale prices, we now consider the

behavior of the spread between them. First, we consider the absolute spread measured in cents per pound of fresh lemons and computed by subtracting the wholesale price of a given week from the corresponding retail price of that same week. Such absolute spreads measure the returns to the store above the cost to the stores of the fresh lemons they sold. From such returns, of course, the stores must deduct costs of doing business such as payments for labor, rent, and supplies before net returns to the store can be computed.

In Figure 9 are given the average weekly spreads, by the three groups of stores, during the year being analyzed. The upper panel shows the weekly absolute spreads which we shall first consider. Examination of the picture of weekly absolute spreads clearly indicates that their behavior differs among the three store groups, particularly over the very short run such as several weeks. But the absolute spreads for all of the store groups followed a rising trend during the year. This tendency, it can be recalled, is the same as what occurred in the weekly prices. But the absolute spreads reflect less of a sharp break in level between the two halves of the year; rather, the absolute spreads appear to have followed more of a gradual upward advance.

In review of the weekly absolute spreads, another characteristic noticeable is that for the Group IV or large stores there is a strong tendency for the spread at times to fall or rise more sharply than is generally characteristic of the other stores. To the extent that the weekly absolute spread for large stores differs from that prevailing in the other stores, such tendency apparently depends in the main on the large stores having, at irregular times, sharp reductions in their absolute spread. By comparing the upper panel of Figure 9 with the lower panel of Figure 8, it appears that there is a tendency for such behavior in the Group IV absolute spread to be positively correlated with the Group IV wholesale price. But such positive correlation is not as clearly evident between the brief and sharp peaks in the absolute spread for Group IV stores and their wholesale price. There will be more on this point later. Now, we move on to the quantitative measures below to uncover more definite relations between the average weekly absolute spreads of the three groups of stores:

FIGURE 9. LEMONS; SPREADS BETWEEN RETAIL AND WHOLESALE PRICES
BY STORE GROUPS, WEEKLY, AUG. 2, 1948 TO JULY 30, 1949

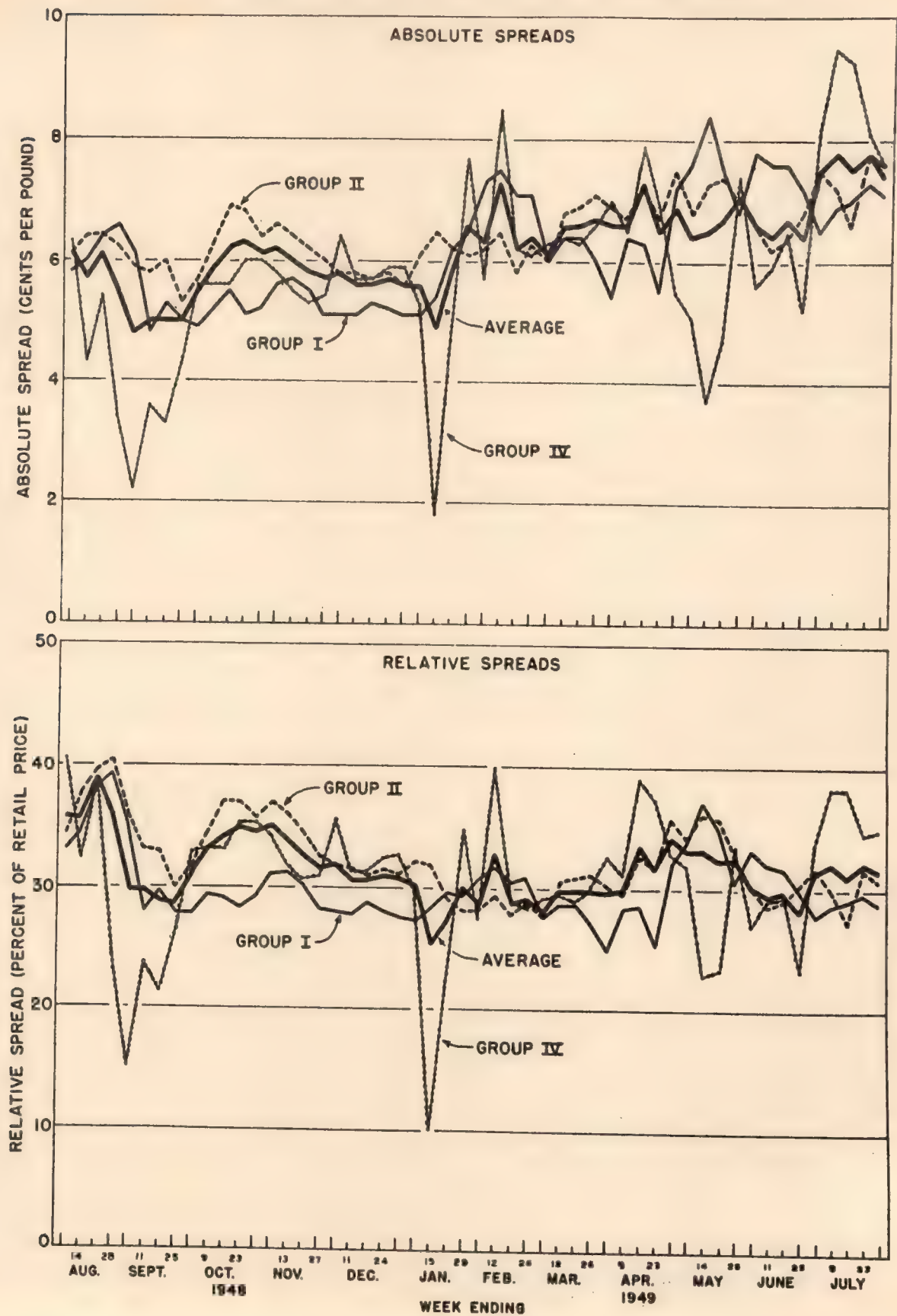


TABLE 20

Average Weekly Absolute Spreads Between
Retail and Wholesale Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
	cents per pound		
Group I stores	5.5	6.9	6.2
Group II stores	6.1	6.9	6.5
Group IV stores	5.1	6.6	5.9
All stores combined	5.7	6.8	6.3

In both the first and second halves of the year analyzed, the large stores tended to have lower absolute spreads than did the other stores and the same applied to the year as a whole. When the small- and medium-sized stores are compared, a consistent relationship over time is not found. In the first half of the year, the small stores experienced a lower average weekly absolute spread than the medium-sized stores; but in the second half of the year, the difference was so slight that it may be concluded that the small- and medium-sized stores had about equal weekly absolute spreads. For the year as a whole, the small stores classified in Group I averaged a somewhat smaller absolute spread than did the medium-sized stores in Group II; but as noted above, the large stores in Group IV averaged the lowest weekly absolute spread for fresh lemons sold at retail. Here, as for the retail and wholesale prices discussed earlier, all fresh lemons are pooled together, and in this report no attention is given to differential sizes or grades of fresh lemons handled by the various stores. Thus, the results presented so far and throughout this report reflect the aggregate experience in prices and spreads for the respective groups of stores.

When we turn to the structural variability of the weekly absolute spread, again by the three groups of stores considered separately, we find the tendencies reflected by the following coefficients of variation:

TABLE 21
Coefficients of Variation in Average
Weekly Absolute Spreads of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
	per cent		
Group I stores	9	10	13
Group II stores	6	7	9
Group IV stores	25	20	25
All stores combined	8	7	12

The relative variability is highest in the large stores, by a substantial amount, in both halves of the year, and the variability is lowest in the medium-sized stores also in both halves of the year. This type of differential behavior in the relative variability of the weekly absolute spread is of a different pattern from those found in the relative variabilities of weekly retail and wholesale prices. There also the large stores displayed the highest variability, but the small stores did not tend to have higher variability than did the medium-sized stores. The small stores had either a slightly lower or about the same degree of variability than the medium-sized stores. It may be noted, however, that the relative variability of weekly absolute spread for the small stores in Group I is not substantially higher than that for the stores in Group II; but the coefficient for the large stores in Group IV is sufficiently larger than those of the other stores to leave little doubt that the difference is a real one and unlikely due to sampling variations.

We may now briefly interrupt our progress with the reporting of further empirical results in order to begin a synthesis of the behavior of the weekly retail and wholesale prices and the absolute spread between them and to clarify their interrelations. The weekly retail prices of lemons generally tended to be lowest in the large stores and highest in the small stores, with the medium-sized stores usually in between. The weekly wholesale prices generally tended to follow the same pattern. In the absolute spread, the large stores usually experienced the lowest

figure, and the small stores had one which usually was lower than in the medium-sized stores. Exceptions mainly are situations where the weekly retail prices in the small- and medium-sized stores are at about the same level and where the absolute spreads for those two stores are at about the same level. The exceptions, hence, are cases where the retail price or absolute spread in the small- and medium-sized stores behaves similarly. But the results for the large stores in Group IV consistently are distinctive from the results of the other two groups of stores.

The interrelations of weekly prices and spreads make clear the observation that weekly retail prices in the large stores are lower than in the other stores not only because the large stores purchase their fresh lemons more cheaply than do the other stores but also because the large stores receive a smaller absolute spread than do the other stores. But even if the large stores used the higher spread of the other stores, the wholesale cost to the large stores was sufficiently less than that paid by the other stores so that the retail prices in the large stores could still be under the retail prices in the other stores. Thus, the evidence suggests that the purchase potential of the large stores, or the ability they have in purchasing at sufficiently lower prices than do the other stores, is the dominant factor accounting for their ability to quote lower retail prices. The lower absolute spread in the large stores apparently is of secondary importance as an explanatory factor in the relative level of retail prices in the large stores compared with the other groups of stores.

Although the small stores generally have their weekly retail prices of lemons at a higher level than do the medium-sized stores, the small stores usually have a smaller spread. Thus, the smaller stores pay a higher price for their fresh lemons than do the medium-sized stores. The reduced spread experienced by the small stores may be interpreted as evidence of attempts by the small stores, despite their higher wholesale costs for fresh lemons, to keep their retail prices somewhat in line with the medium-sized stores. Although the small stores do not attain that objective completely, they approach it closer than if they used absolute spreads of the magnitude used by the medium-sized stores.

The medium-sized stores, paying wholesale prices which are lower than those of the small stores and higher than those of the large stores,

are generally able to maintain their absolute spread at least as high, usually higher, than that of the small stores and definitely higher than the absolute spread of the large stores. From the view of unit earnings as reflected by the absolute spread, the medium-sized stores are in the most favorable position. This, of course, is different from the most favorable position in terms of net profits which are a function of the volume of sales and costs of doing business as well as the influences so far considered here.

Relative Spreads Between Weekly Retail and Wholesale Prices of Lemons.--As a sequel to the above consideration of the weekly absolute spread and its relations to the prices from which it is derived, we now turn to the weekly relative spread for fresh lemons. As noted earlier, the relative spread in a given week is equal to the absolute spread of that week expressed as a percentage of the retail price in that given week. Thus, a relative spread measures the rate of return over the wholesale cost of the fruit in relation to the retail price. Relative spreads, in addition to having behavior characteristics of their own, are useful measures in comparing the relative returns over the cost of the product for various products or even a single product quoted at times in different units.

The weekly relative spreads for fresh lemons are shown in the lower panel of Figure 9, with each of the three store groups recorded separately and along with the over-all average relative spread for all stores combined. As previously found for fresh oranges, the relative spreads for fresh lemons tend to fluctuate around a horizontal trend line. This applies to each of the three store groups. But there are differences in the behavior of the relative spreads of small-, medium-, and large-sized stores.

The general conformation of the relative spread approximates that of the absolute spread with its trend removed. But variations from the absolute spread still remain, due to the differential behavior of the retail price. Yet, the major fluctuations in the weekly relative spread correspond to and occur simultaneously with the major fluctuations in the weekly absolute spread for fresh lemons. This is clearly evident from a comparison of the upper and lower panels in Figure 9.

To begin a more detailed account of the weekly relative spread, we again resort to measures as given in the following table:

TABLE 22
Average Relative Spreads in
Weekly Retail Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
	per cent		
Group I stores	30	30	30
Group II stores	34	31	32
Group IV stores	30	31	31
All stores combined	32	31	31

These statistics suggest that the medium-sized stores tend to have a slightly higher relative spread than do the small or large stores. This differential was more pronounced in the first half of the year and sufficiently so to outweigh the experience in the second half when the relative spreads for all three groups of stores were just about at the same level. But during the first half of the year, the large and small stores had equal relative spreads, and the same almost occurred in the second half of the year. In fact, the differences in the relative spreads of the three groups of stores, over the year as a whole and especially during the second half, are sufficiently minute so that it may be doubtful whether any real differences exist--that is, any differences other than those resulting from sampling fluctuations. If this is so, it appears that the large stores, as compared with the other stores, tend to follow a different pricing policy and practice for fresh lemons than for fresh oranges. It also appears that the large stores enjoy relatively large net returns from fresh lemons, in terms of their investment in the fruit, when consideration is given to the volume they handle. More uniformity exists among the relative spread of the three groups of stores than one might presume from a superficial look at their prices.

In view of the uniformity in the average levels of the weekly absolute spreads in the small, medium, and large stores, it is of some

interest to inquire whether such uniformity carries over to the variability of the relative spread as it changes from week to week in each of the three groups of stores. For that reason, the following measures of variability in the weekly relative spreads for fresh lemons were computed:

TABLE 23
Coefficients of Variation of
Weekly Relative Spreads of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
	per cent		
Group I stores	10	9	10
Group II stores	9	8	9
Group IV stores	23	15	19
All stores combined	9	6	8

These figures clearly indicate that the small- and medium-sized stores experience about the same degree of variability in their weekly relative spreads. But the situation changes for the large stores in Group IV. Their degree of variability in the weekly relative spread is definitely of a greater magnitude than is typical of the other stores. Thus, although over periods of time such as several months, the average level of relative spreads in the three groups of stores approximate each other very closely, the small and large stores have much less variability in their weekly relative spreads than does the group of large stores.

Relations of Weekly Spreads to Prices of Lemons.--The data developed and reviewed so far indicate that there do prevail certain relationships between the spread and prices. Some such relationships were discussed above in terms of their reflection in the series as they are charted over time. But to probe somewhat further into the nature of the relationships, they may now be examined by a different manner of analysis. We now endeavor to uncover, in more precise terms, the general tendencies between the retail and wholesale prices of fresh lemons and the spread between them. Also, we endeavor to make clear the departures or discrepancies from the general tendencies which exist.

In Figure 10 are presented scattergrams of the absolute spread plotted against the weekly retail price of fresh lemons. The upper left panel includes the data for all stores combined, and each of the other three panels includes the data for one of the store groups considered in this report. In each panel, the vertical axis measures the magnitude of the weekly absolute spread, and the horizontal axis measures the magnitude of the corresponding weekly retail price. Both the retail price and the absolute spread are expressed in units of cents per pound of fresh lemons. Also, in each of the panels, the data for the weeks in the first half of the year are distinguished from the data for the weeks in the latter half of the year investigated. As earlier, Group I includes the small stores, Group II includes the medium-sized stores, and Group IV includes the large stores in the sample on which the study is based.

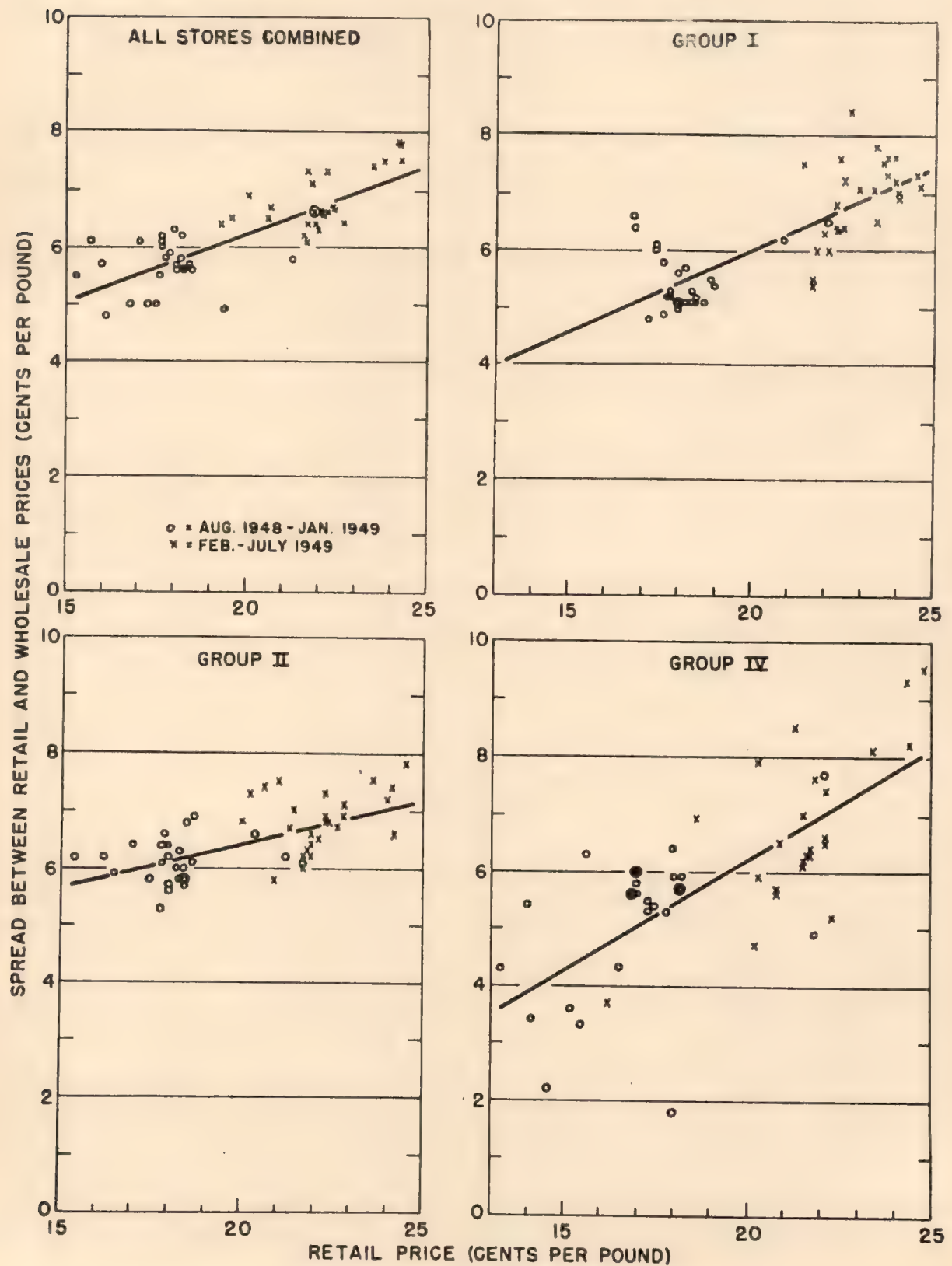
The existence of a noticeable tendency for the weekly absolute spread to be positively correlated with the weekly retail price of fresh lemons is evident from visual inspection of Figure 10. Although such correlation appears in each of the panels, the degree of correlation differs for the three store groups. One may wonder about the relationship in the first half of the year as compared with the second half. The following measures indicate the comparative correlations:

TABLE 24
Coefficients of Correlation Between Weekly
Absolute Spreads and Retail Prices of Lemons
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
Group I stores	+0.20	+0.51	+0.79
Group II stores	+0.08	+0.31	+0.62
Group IV stores	+0.48	+0.72	+0.72
All stores combined	+0.30	+0.65	+0.80

The above correlation coefficients suggest that the relationship was weaker in the first half of the year than in the second half. This was characteristic of all three groups of stores. But even in the second half of the year, the correlations were not what might be described as "high."

FIGURE 10. LEMONS; RELATION BETWEEN RETAIL-WHOLESALE PRICE SPREAD AND RETAIL PRICE, BY STORE GROUPS
WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



In both halves of the year, the medium-sized stores had a lower correlation than the other two store groups, and in the first half the correlation for Group II was extremely weak. When the year as a whole is considered, the correlations are higher and again the correlation for medium-sized stores is less than those for the other two groups of stores. This differential behavior of Group II stores is consistent with previous findings about the spread of those stores as compared with the other two groups.

With the above correlations as part of the background, we now consider the regression of the weekly absolute spread on the weekly retail price. In view of the marked difference apparent in the relations for the first and second halves of the year, we review their regressions separately before passing on to the year as a whole. The regression coefficients for the first half of the year are as follows:

TABIE 25

Equations of Linear Regression of Weekly
Absolute Spreads on Retail Prices of Lemons
August 1948-January 1949

Store group	Constant	Regression coefficient
	cents per pound	
Group I stores	3.8 (2.2) <u>a/</u>	+0.93 (1.00)
Group II stores	5.7 (5.4)	+0.02 (0.39)
Group IV stores	-0.2 (0.1)	+0.31 (2.65)
All stores combined	3.9 (3.5)	+0.10 (1.50)

a/ Figures in parentheses are t-ratios.

For the period August 1948-January 1949, the regressions of the weekly absolute spread on the weekly retail price are not statistically significant for Store Groups I and II. For the large stores, the constant term of the regression equation is not statistically significant, whereas the regression coefficient is acceptable if not with a high degree of statistical significance. Hence, it may be conjectured that during the first half of the year being analyzed the large stores' aggregate relation of the weekly absolute spread to the weekly retail price is such that, aside

from sampling variation, the regression line passes through the origin. With such a view, the regression coefficient indicates that the large stores generally followed the practice, in the first half of the year, of using a constant relative spread of about 30 per cent of the retail price. Of course, there were variations, as is evident in the Group IV panel in Figure 10, but the relative spread of 30 per cent corresponds with that found earlier as an average for the period. With respect to Store Groups I and II, however, the data in Figure 10 do not support the view that they tended to use a weekly relative spread which is invariant to the level of the weekly retail price.

We may now look at the extent to which the situation differs in the second half of the year as compared with the first half. The regression statistics for the latter half of the year are as follows:

TABLE 26
Equations of Linear Regression of Weekly
Absolute Spreads on Retail Prices of Lemons
February 1949-July 1949

Store group	Constant	Regression coefficient
	cents per pound	
Group I stores	-2.2 (0.7) ^{a/}	+0.39 (2.93)
Group II stores	3.9 (2.1)	+0.13 (1.61)
Group IV stores	-2.7 (1.4)	+0.44 (5.01)
All stores combined	1.4 (1.0)	+0.24 (4.16)

^{a/} Figures in parentheses are t-ratios.

These statistics^{1/} show that the situation in the second half of the year differed markedly from that which prevailed during the first half of the

^{1/} Subtracting the regression coefficients in Table 26 from 1 yields the corresponding coefficients of regression of the weekly wholesale price on the weekly retail price; and the t-values of the latter coefficients are related to the t-values in Table 26 in the following way:

$\frac{t_1}{t_2} = \frac{b_1}{b_2}$. The same applies to the regression coefficients and their t-values in Tables 25 and 27.

year. This may be interpreted as suggesting that half-year periods are insufficient in which to uncover or establish stable regression relationships between the weekly absolute spread and the weekly retail price. Hence, we look at the relationships characteristic of the year as a whole.

The solid heavy lines in Figure 10 are graphical expressions of the regressions of the weekly absolute spread on the corresponding weekly retail prices of fresh lemons for the entire year. The regressions, however, may be more readily compared for the three groups of stores by examination of the following data:

TABLE 27

Equations of Linear Regression of Weekly
Absolute Spreads on Retail Prices of Lemons
August 1948-July 1949

Store group	Constant	Regression coefficient
	cents per pound	
Group I stores	0.2 (0.4) <u>a/</u>	+0.29 (9.05)
Group II stores	3.4 (6.2)	+0.15 (5.58)
Group IV stores	-1.4 (1.4)	+0.38 (7.39)
All stores combined	1.5 (3.1)	+0.24 (9.60)

a/ Figures in parentheses are t-ratios.

When these regression statistics reflecting the year as a whole are examined, it is noted that all of the coefficients are acceptable from the view of statistical significance. But only for the medium-sized stores in Group II are both the constant terms and the regression equation acceptable in terms of statistical significance.

For Group I stores the yearly regression relationship supports the interpretation that the small stores during the year tended to use a relative spread of almost 30 per cent and which generally was invariant with respect to the level of the retail price experienced during that year. This relative spread of almost 30 per cent corresponds to the average relative spread found for Group I stores earlier when reviewing the time trend of the relative spreads of the several store groups.

When Store Group II is considered from the view of the year as a whole, the absolute weekly spread is related to the weekly retail price as follows: As the weekly retail price changes 1 cent, the corresponding weekly spread simultaneously changes in the same direction by an amount of almost 0.2 cent. In contrast, for the large stores in Group IV when the weekly retail price changes 1 cent per pound, the corresponding weekly spread changes in the same direction by an amount of almost 0.4 cent. The absolute spread is most sensitive to changes in the retail price in the large stores and least sensitive to changes in the retail price in the medium-sized stores. Here again, therefore, we find differential behavior in the pricing practices of the three groups of stores.

We now examine the regression relations between the weekly absolute spread and the weekly wholesale price of fresh lemons. Some pertinent data, for the year as a whole, are summarized as follows:^{1/}

TABLE 28
Equations of Linear Regression of Weekly
Absolute Spreads on Wholesale Prices of Lemons
August 1948-July 1949

Store group	Constant	Regression coefficient	Correlation coefficient
	cents per pound		
Group I stores	2.21 (2.65) ^{a/}	+0.28 (4.84)	+0.56
Group II stores	4.82 (9.74)	+0.12 (3.39)	+0.43
Group IV stores	3.24 (2.43)	+0.20 (2.00)	+0.27
All stores combined	2.89 (5.21)	+0.24 (6.10)	+0.65

^{a/} Figures in parentheses are t-ratios.

The correlation between the weekly absolute spread and wholesale price is lower for the large stores than for the small- and medium-sized ones.

^{1/} The addition of 1 to the regression coefficients in Table 28 gives the corresponding coefficients of regression of the weekly retail price on the weekly wholesale price, and the t-ratios are related as follows:

$$\frac{t_1}{t_2} = \frac{b_1}{b_2}.$$

The regression relationships are similar. The data suggest that the absolute spread in the medium-sized stores is less sensitive to changes in their wholesale price than what prevails in the small and large stores. In each of the groups of stores when the entire year is considered, it appears that the relative spread is not invariant to the level of the wholesale price, although such a relationship is less pronounced in the large than in the other stores.

When we consider the relations of weekly relative spread to the weekly retail prices, we find the following results:

TABLE 29
Equations of Linear Regression of Weekly
Relative Spreads on Retail Prices of Lemons
August 1948-July 1949

Store group	Constant per cent of retail price	Regression coefficient	Correlation coefficient
Group I stores	32.06 (9.48) <u>a/</u>	-0.09 (0.56)	-0.08
Group II stores	50.28 (17.70)	-0.89 (6.37)	-0.67
Group IV stores	23.74 (4.38)	+0.36 (1.29)	+0.18
All stores combined	40.02 (15.19)	-0.43 (3.27)	-0.42

a/ Figures in parentheses are t-ratios.

Only for Group II stores are the correlation and regression results acceptable from the view of statistical significance. The results for the Group II stores indicate that, as their weekly retail price changes, say by 1 cent a pound, the relative spread changes in the opposite direction in an amount of about 0.9 cent. The weekly relative spread in the medium-sized stores is substantially more sensitive to changes in the retail price than is the relative spread in either the small or large stores.

To progress with the picture of the relations between the weekly spread and weekly price, we now turn to the regression of the weekly relative spread on the weekly wholesale price. Some pertinent data computed are as follows:

TABLE 30
Equations of Linear Regression of Weekly
Relative Spreads on Wholesale Prices of Lemons
August 1948-July 1949

Store group	Constant per cent of retail price	Regression coefficient	Correlation coefficient
Group I stores	38.53 (13.07) <u>a/</u>	-0.58 (2.86)	-0.38
Group II stores	49.37 (28.38)	-1.24 (9.91)	-0.81
Group IV stores	43.18 (8.62)	-0.95 (2.53)	-0.34
All stores combined	42.35 (20.94)	-0.79 (5.44)	-0.61

a/ Figures in parentheses are t-ratios.

Only for the Group II stores is the correlation coefficient of acceptable magnitude. As their wholesale price changes, the weekly relative spread tends to change in the opposite direction. Qualitatively, similar relations hold for the relative spreads and wholesale prices in the small and large stores, but the degree of relationship is not nearly as pronounced as it is in the medium-sized stores.

For all three groups of stores, the constants in the regression equations are statistically significant. Thus, there appears no basis for the view that the weekly relative spread is invariant with respect to the level of the weekly wholesale price. As with the retail price, the relative spread in Group II stores is more sensitive to changes in the weekly wholesale price than is the spread in the Groups I and IV stores. In the small stores, as the weekly wholesale price changes by 1 cent per pound, the weekly relative spread on the average changes in the opposite direction in an amount of about 0.6 per cent. But in the medium-sized stores, the relative spread changes in the opposite direction by an average amount of about 1.2 per cent as the wholesale price changes 1 cent per pound. In the large stores, the tendency is such that, with a change of 1 cent per pound in the weekly wholesale price, the relative spread changes in the opposite direction in an average amount of slightly less than 1 per cent.

Relations of Weekly Spreads to Retail Sales of Lemons.--Investigation of the correlation and regression relations between the weekly absolute spreads and the volume of fresh lemons sold at retail by each of the three groups of stores was disappointing (see Tables 62 and 63) in that no significant relationships were uncovered. This applies to the small stores as well as the medium- and large-sized ones. In all cases, where the data for the year as a whole were considered, the regression coefficients were statistically insignificant as were the correlation coefficients. The situation was only somewhat different when weekly relative spreads were considered in relation to the volume sold at retail (see Table 65). For the small- and medium-sized stores, there are significant regressions of the weekly relative spread on the sales volume, but such was not the case for the large stores. In view of the mixed nature of these results of relations between weekly spreads and retail sales of lemons, further discussion of them is deferred until the Summary and Comparison of Findings. We next consider weekly prices and retail margins of grapefruit.

GRAPEFRUIT: WEEKLY PRICES AND RETAIL MARGINS

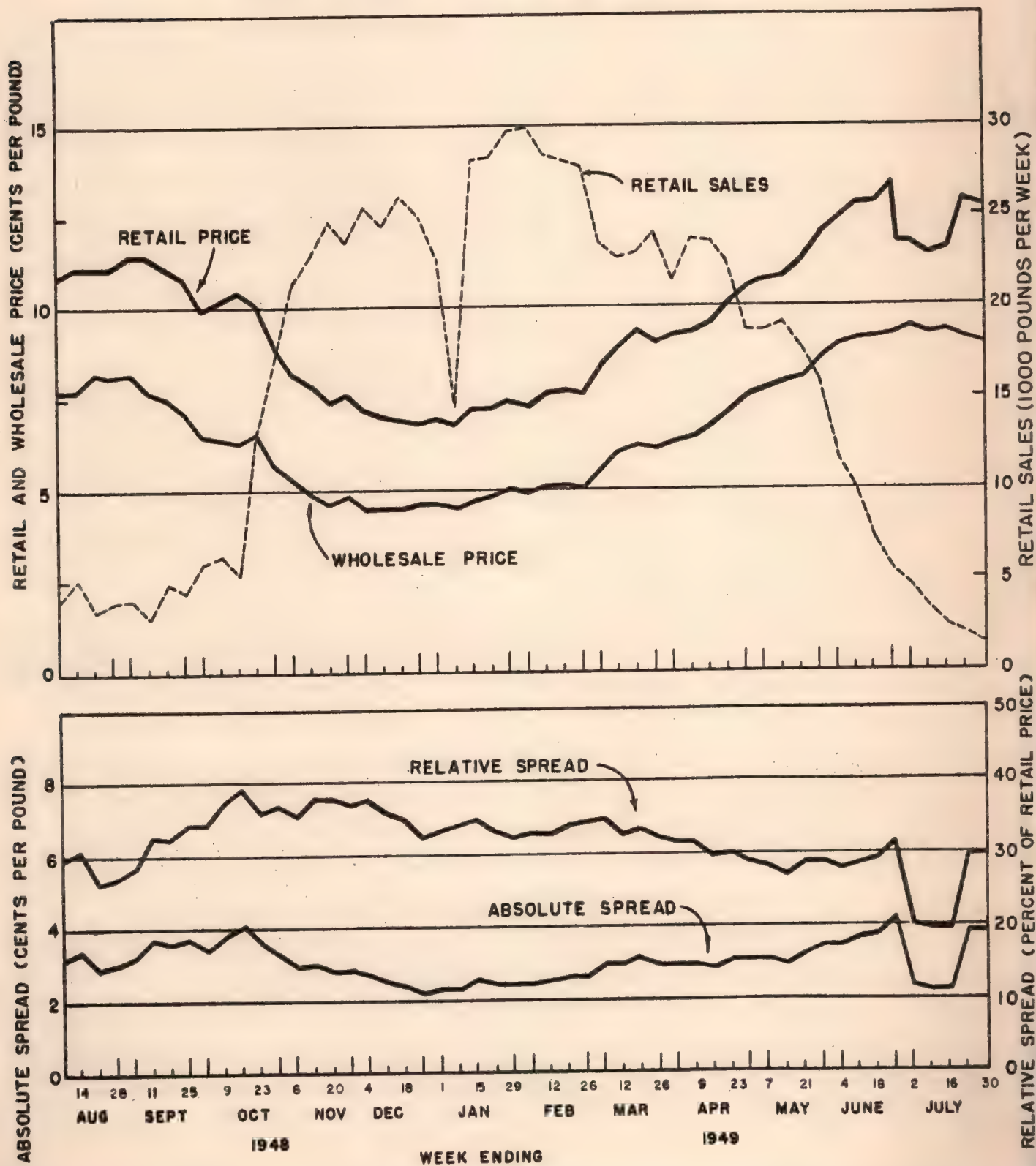
In the preceding sections, we were concerned with two of the major citrus fruits, fresh oranges and lemons. We now turn to fresh grapefruit, the third major citrus fruit. The method of review follows closely that used in the previous sections. Such procedure permits comparison of the behavior of the retail and wholesale prices, and the spread between them, of the three major fresh citrus fruits.

Grapefruit is produced on a commercial basis in the several citrus-producing areas. Like oranges, grapefruit is grown for market sale in Florida and Texas as well as in California. Although Florida and Texas lead California in the production of grapefruit, the fruit is of considerable importance in the citrus economy of California.

Like oranges and lemons, grapefruit is a multiple-use product. Grapefruit is processed into canned segments as well as canned grapefruit juice or canned orange-grapefruit juice blend. Such product uses take a significant portion of the grapefruit crop. But here, as in the previous sections on oranges and lemons, we give attention to the retail and wholesale prices of the fresh fruit sold in Denver during the same period considered above for fresh oranges and fresh lemons. Also, as for those two fruits, no direct attention is given to the differences among sizes and grades of the grapefruit or the producing areas in which they originate. We review the behavior of fresh grapefruit prices by the means of aggregate measures reflecting the combined influences of price-affecting factors of size, grade, and type of grapefruit.

Weekly Wholesale and Retail Prices of Grapefruit.--Figure 11 shows data which summarize the course of prices of fresh grapefruit in Denver during the year August 1948-July 1949. In the upper panel are shown the weekly retail prices and sales as well as the wholesale prices. The pattern of weekly sales of fresh grapefruit exhibits a pronounced seasonal pattern during the year. Supplies and sales are at a low level as the summer closes but begin to rise sharply in the autumn. The seasonal peak in supplies and sales generally occurs during the midwinter, January-February. Thereafter, they decline at first gradually, then more rapidly. By midsummer, supplies of fresh grapefruit are near a low point and remain low until the autumn supplies arrive on the market. It may be noted that

FIGURE II GRAPEFRUIT; RETAIL AND WHOLESALE PRICES, RETAIL SALES, AND SPREAD BETWEEN RETAIL AND WHOLESALE PRICES WEEKLY, AUG. 2, 1948 TO JULY 30, 1949



supplies of fresh grapefruit are in large volume during the same period, the winter season, as when fresh oranges are in large volume. This reflects the seasonal flow of fresh citrus from producing areas as Florida and Texas.

The increased seasonal supplies of fresh grapefruit coincide with a seasonal depression in the retail and wholesale prices of fresh grapefruit. This seasonal pattern of prices is easily evident from the weekly prices in the upper panel of Figure 11. The prices generally are at a relatively high level as the summer closes, then recede during the autumn period. By midwinter, fresh grapefruit prices have reached their seasonal low. As spring approaches, the prices begin to advance and continue to do so while supplies are becoming shorter. And by the time supplies are reaching their seasonal low level in the summer, the prices have attained their seasonal high level.

Although the specific levels of the prices of fresh grapefruit during the year being reviewed may not be characteristic of other years, the general confirmation of the seasonal price pattern is typical of most years. In the year here considered, the retail price of fresh grapefruit in Denver reached a low of about 7 cents a pound and reached a peak of about 13 cents a pound or nearly a doubling in the retail price. This amount of variation from seasonal low to seasonal high is not unusual. Similarly, the wholesale price was at a low of slightly under 5 cents a pound and reached a high point of above 9 cents a pound, again nearly a doubling in the wholesale price. The upper panel of Figure 11 shows that general patterns of seasonal price variations are somewhat similar in the retail and wholesale prices.

The wholesale prices referred to in the upper panel of Figure 11 are weekly averages computed by weighting the daily wholesale prices by the volume of fresh grapefruit sold by the stores on the respective days. Thus, the wholesale prices measure the average cost to the stores of the fresh grapefruit they sold in the respective weeks. The weekly retail prices, in turn, are computed so as to measure the average gross return per pound to the stores for the fresh grapefruit they sold in the respective weeks. Thus, the retail and wholesale prices pertain to the same fresh grapefruit that sold at retail by the stores in the respective weeks.

The weekly absolute spread measures the difference, in terms of cents per pound, between the weekly retail price and the corresponding weekly wholesale price. Hence, the absolute spread for a given week measures how much the stores received per pound over and above the cost of the fruit they sold that week. This applies even if the grapefruit was bought by the stores in some previous week. Although the upper panel of Figure 11 suggests that the general movements during the year of the weekly wholesale and retail prices conform fairly closely, there is not perfect conformation. The lack of identical movement is reflected by the spreads shown in the lower panel of Figure 11. As is evident from the lower panel of Figure 11, the absolute spread during the year varied from slightly over 2 cents per pound to slightly over 4 cents per pound. During August, September, and the first half of October 1948, the weekly absolute spread tended to rise but then declined and did so until the end of 1948. During all of the first half of 1949, the absolute spread tended to increase but broke at the end of June only to recover to almost 2 cents per pound as July 1949 closed.

Inspection of Figure 11 indicates that the general seasonal movement of the weekly absolute spread conforms in part to the seasonal movement of the prices, but there are important exceptions in more detail discussed later. Here, attention may be called to the period of August-October 1948 when the absolute spread and the prices tended to move in opposite directions and July 1949 when the absolute spread behavior resembled that of the retail price but not that of the wholesale price.

The fact that the weekly absolute spread varies over time suggests that the pricing practices used by the stores do not yield constantly uniform returns to them over time in terms of, say, cents per pound. Whether the stores receive constantly over time uniform relative returns in terms of per cent of the prices is next considered.

The lower panel of Figure 11 shows, along with the absolute spread just touched upon, the average weekly relative spreads. The relative spread for a given week, as explained in the previous sections, is derived by expressing the absolute spread of that week by the retail price of that same week.

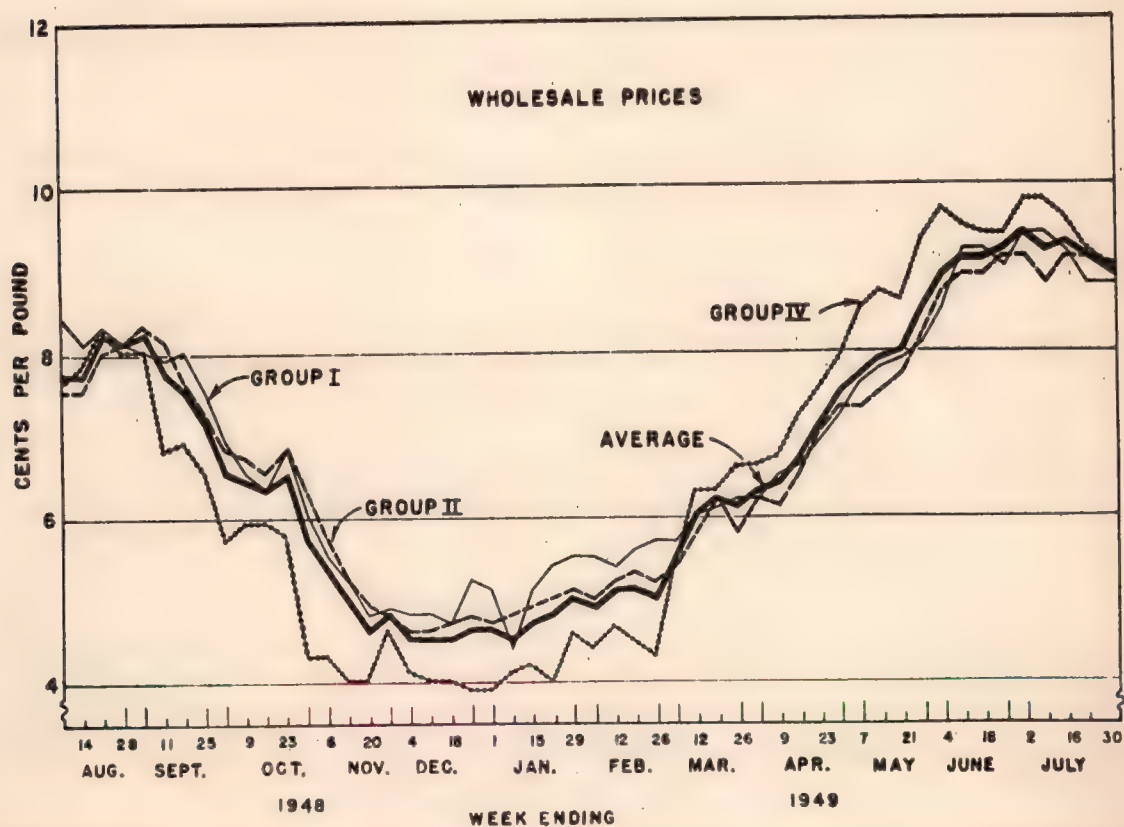
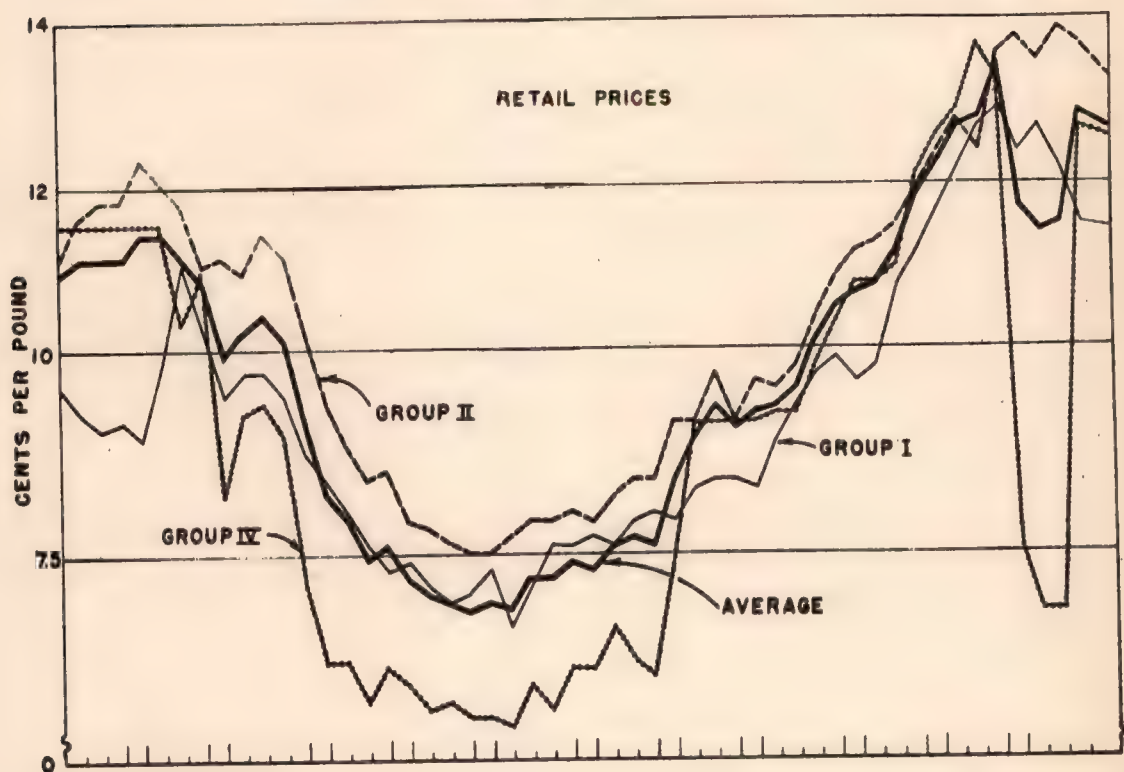
The weekly relative spread for fresh grapefruit reached a high point of about 39 per cent and a low point of slightly less than 20 per cent. This amount of variation in the average weekly relative spread is not

unusual during the course of a year. No apparent level is evident during the year around which the relative spread tended to fluctuate. More on this later, but it is evident so far that over some periods the weekly relative spread for fresh grapefruit moves in the same direction as the weekly absolute spread, but in other periods the two spreads do not behave the same. Thus, as in the previous sections, the behavior patterns of the absolute and relative spreads must be considered separately. This can be done advantageously while reviewing the differential characteristics of the prices and spreads in the several groups of stores. But at this point it is clear that, although grapefruit is citrus fruit as are oranges and lemons, grapefruit prices and spreads do not necessarily behave as do those of fresh oranges or fresh lemons. They have some common and some differential characteristics of price and spread behavior.

Behavior of Weekly Retail Prices of Grapefruit.--In Figure 12, the upper panel, are given the average weekly retail prices of fresh grapefruit during the year analyzed. Weekly retail prices are included for small stores (Group I), medium-sized stores (Group II), and large stores (Group IV); also are shown the over-all average weekly retail prices for all stores combined, the same weekly retail price series given in the upper panel of Figure 11.

From the upper panel of Figure 12, it is evident that the three store groups had retail prices which exhibited the same general course during the year. But differences are noticeable in the trends of retail prices for the three groups of stores. Especially noticeable are the following characteristics. During the first two months, retail prices in the small stores (Group I) were substantially below the prices in the other stores. But by the end of September 1948, retail prices in the small stores advanced so as to approach the prices in the other stores. Beginning early in October 1948, retail prices of fresh grapefruit sold in the large stores went below the prices in other stores and remained so for the next five months. Not until the middle of March 1949 did retail prices in the large stores advance to rejoin a level near the prices in other stores. This continued until the end of June 1949 when the retail price for fresh grapefruit sold in the large stores broke sharply and remained very low, in relation to other stores, for three weeks. Then, the retail prices in the large stores recovered.

FIGURE 12. GRAPEFRUIT, RETAIL AND WHOLESALE PRICES, BY STORE GROUPS
WEEKLY, AUG 2, 1948 TO JULY 30, 1949



In the meantime, retail prices in the medium-sized stores during most of the period were above the average prices in the other two groups of stores. But during the late spring and early summer months of 1949, the weekly retail prices in the small stores averaged under the prices of the large or medium-sized stores. Here, we may again refer to the break in the average retail price for all stores combined which occurred at the end of June and early July 1949, noted in connection with the discussion on Figure 11. The picture of retail prices in Figure 12 clearly shows that the break was due to a sharp drop in the retail prices in the large stores (Group IV). This is an illustration of the necessity of looking behind the average price for all stores combined to uncover the influences affecting the broad average retail price. Below we shall consider further why the large stores had the sharp break in their retail prices. But now the comparative levels of retail prices in the three store groups may be further examined by the following data:

TABLE 31
Average Weekly Retail Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	8.4	10.0	9.2
Group II stores	9.7	11.0	10.4
Group IV stores	8.0	9.6	8.8
All stores combined	9.0	10.4	9.7

The above average weekly retail prices confirm what might be suspected from inspection of the upper panel of Figure 12. The large stores in Group IV averaged the lowest retail prices for fresh grapefruit, while the medium-sized stores in Group II averaged the highest. This relation among the three groups of stores prevailed, on the average, during both the first and second halves of the year. Two further aspects may be noted. The gap between the retail prices of the small and large stores was smaller than the price gap between the small- and medium-sized stores. The average price difference between the small and large stores was less

than 0.5 cent a pound, and the average price difference between the small- and medium-sized stores was at least 1 cent a pound. The second aspect pertains to how the retail price in the large stores averaged lowest in both halves of the year but with different timing in each half. During the first half of the year, the large stores' retail price was lowest during most of the time; but in the second half of the year, the average price in the large stores was pulled down heavily by the sharp break in their retail price near the end of the year. Thus, the relative price position of the large stores was not due to a consistent practice of having the lowest price. Over some periods, the large stores had the lowest prices, but in other periods that position was held by the small stores. According to the record, only very infrequently did the medium-sized stores have the lowest retail price for fresh grapefruit. These generalizations, of course, apply to the average prices of all grades, sizes, and types of fresh grapefruit.

Still dealing with the weekly retail prices of fresh grapefruit, let us now look at their variability over time. Data helpful on this score are the following:

TABLE 32
Coefficients of Variation in
Average Weekly Retail Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	14	18	19
Group II stores	18	18	19
Group IV stores	31	25	29
All stores combined	20	18	20

The above statistics clearly suggest that the variability over time in the weekly retail prices of fresh grapefruit is greater in the large stores than in the small- or medium-sized ones. As to the difference between the small and medium stores, the situation is not so clear; only in the first half of the year is there a noticeable difference and for

the year as a whole that difference is blurred. Also, no unique pattern among the stores is evident for the first half of the year compared with the second. Hence, the major conclusion which may be generalized from the data is that the large stores tend to have greater variability in their weekly retail prices than do the small- and medium-sized stores which over the period of a year tend to have about the same degree of variability.

Behavior of Weekly Wholesale Prices of Grapefruit.--With the above background on the comparative levels and degrees of variability in the weekly retail prices of the three groups of stores, we now pass to the behavior of their wholesale prices. They are shown in the lower panel of Figure 12. Inspection of that figure indicates that the general conformation of the weekly wholesale prices corresponds to that of the weekly retail prices. This suggests that over a period of time the retail prices quoted by the stores tend to follow the prices paid by the stores, but the degree of correspondence varies over time and among the three groups of stores.

Of some significance are the different patterns of wholesale price behavior in the three store groups. The nature of these patterns is partly revealed by the following data:

TABLE 33
Average Weekly Wholesale Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	6.2	7.4	6.8
Group II stores	6.1	7.2	6.7
Group IV stores	5.4	7.6	6.5
All stores combined	6.0	7.4	6.7

The small- and medium-sized stores tend to pay about equal wholesale prices for their fresh grapefruit; although the wholesale prices for the medium stores average slightly lower, the difference is so small it cannot be taken seriously. And it is reasonably clear that the wholesale prices paid by the large stores do not consistently tend to be under the

prices paid by the other stores, although for the year as a whole the large stores did have a small advantage in their wholesale prices. Their wholesale price was sufficiently lower in the first half of the year to offset their higher wholesale price during the second half of the year. For all three groups of stores, the wholesale price in the latter half of the year averaged above the price in the first half, and the difference was about the same for the small and medium stores. But during most of the second half of the year, the wholesale price paid by the large stores was above the wholesale prices paid by the small- and medium-sized stores.

We may consider the major exceptions to the weekly retail prices following the wholesale prices in terms of level and changes in it over time. During August and early September 1948, for example, the small stores had a retail price much lower than the other stores; yet, the small stores paid a wholesale price which was at times above and at other times about equal to the wholesale price of the other stores. During a considerable part of the second half of the year, the small stores again had the lowest retail price but again their wholesale price was not markedly below that of other stores, especially the medium-sized ones. Thus, the comparative wholesale price paid by the small stores did not consistently determine their comparative retail price in relation to that of the other stores.

The medium-sized stores, those classified in Group II, had the highest retail price during most weeks of the year; yet, their wholesale price was slightly below that of the small stores most of the time. This situation is evident from Figure 12 as well as in Table 33 showing semi-annual and full-year averages.

The large stores, those classified in Group IV, exhibited still different behavior. Although they had both the lowest wholesale and retail prices during most of the first half of the year, the situation differed in the latter half. Then, their wholesale prices were above those of the other stores most of the time, yet, their retail prices were mostly between those of the small- and medium-sized stores. The sharp break in the weekly retail price in large stores in June and early July 1949, which pulled down the average for the second half of the year, did not reflect or occur in response to a corresponding break in the wholesale price paid by the large stores. In this instance, the retail price in the large

stores moved independently of the wholesale price, and their retail price break developed for reasons other than a break in the wholesale market price. These differences are sharpened for inspection below where we review the behavior of the spreads between the retail and wholesale prices, but first we review the degrees of variability in the weekly wholesale prices of the three groups of stores.

We now turn to a review of the variability over time in the weekly wholesale prices of the three groups of stores and all stores combined. The pertinent statistical data are as follows:

TABLE 34
Coefficients of Variation in
Average Weekly Wholesale Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	22	19	22
Group II stores	21	20	22
Group IV stores	28	24	31
All stores combined	23	22	25

These data indicate that the small and large stores experience about the same degree of variability in their weekly wholesale prices of grapefruit. This was characteristic of the first and second halves of the year as well as the year as a whole. The large stores, however, experienced a higher degree of variability in their weekly wholesale prices than did the remaining stores. This was more pronounced in the first than in the second half of the year and is clearly evident when the year as a whole is considered.

These results of variability in the weekly wholesale prices correspond to the results of the weekly retail price variability. There, also, the small and medium stores had nearly comparable variabilities and that of each was noticeably less than the variability of the weekly retail prices in the large stores. It is clearly evident that the prices paid and received by the large stores for fresh grapefruit have less relative

stability over time than do the prices paid and received by the small- and medium-sized stores.

Absolute Spreads Between Weekly Retail and Wholesale Prices of Grapefruit.--In the upper panel of Figure 13 are shown the weekly absolute spreads derived from the weekly retail and wholesale prices of fresh grapefruit reviewed in the preceding pages. The absolute spread of a given week is computed by subtracting from the average retail price of that week the corresponding wholesale price of that same week. Thus, the absolute spread measures returns, in cents per pound, from which the stores must pay the costs of doing and staying in business before arriving at the residual usually referred to as net profits.

The weekly absolute spreads of the several groups of stores followed, in the main, a similar course. For each, there was a narrowing of the absolute spread near the middle of the year. But the absolute spreads, in each of the store groups, varied from week to week and also were at different levels. The comparative average levels of the absolute spread may be summarized as follows by store groups:

TABLE 35

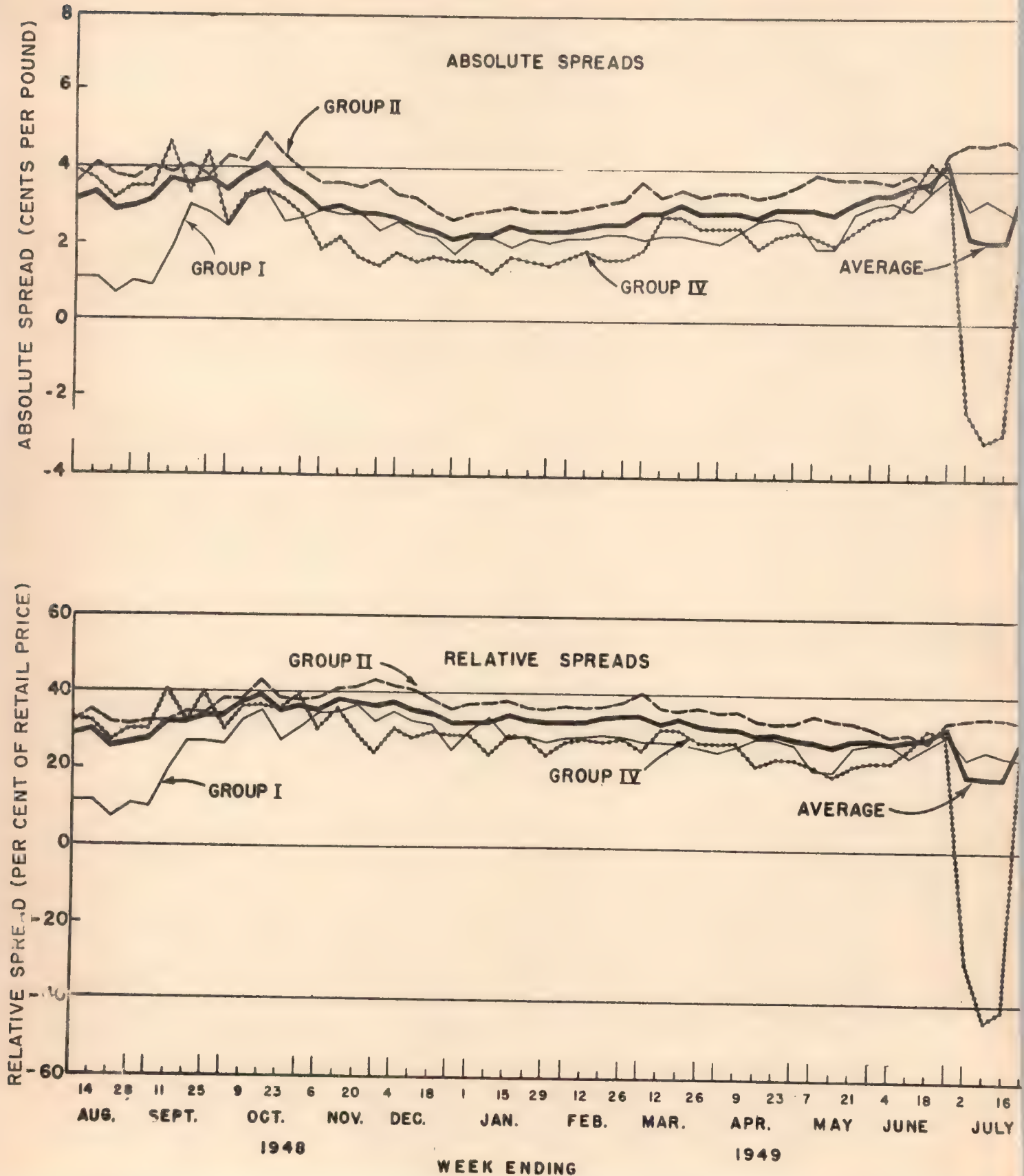
Average Weekly Absolute Spreads Between
Retail and Wholesale Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	cents per pound		
Group I stores	2.2	2.6	2.4
Group II stores	3.6	3.7	3.7
Group IV stores	2.6	2.0	2.3
All stores combined	3.0	3.0	3.0

These statistics bring into focus the trends illustrated in the upper panel of Figure 13. In both halves of the year investigated, the medium-sized stores in Group II averaged higher absolute spreads than did either of the other two group stores. A similar situation also prevailed for the year as a whole.

But when the absolute spreads of the small and large stores are compared, the situation is mixed. In the first half of the year, the small

FIGURE 13. GRAPEFRUIT, SPREADS BETWEEN RETAIL AND WHOLESALE PRICES BY STORE GROUPS, WEEKLY, AUGUST 2, 1948 TO JULY 30, 1949



stores experienced on the average a narrower absolute spread than did the large stores. In the second half of the year, however, the large stores had the narrower absolute spread. This change in relative position nearly balanced out so that over the year as a whole the small and large stores averaged about equal absolute spreads.

In our earlier discussion of the weekly retail prices, attention was called to the sharp break in the retail price of fresh grapefruit sold in the large stores at the end of June and early July 1949. Later it was noted that no similar break occurred in the wholesale prices paid by the large stores for the fresh grapefruit they sold in those weeks. Thus, a narrowing of the absolute spread of the large stores absorbed the marked reduction in their retail price. This is reflected by the sharp reduction in the Group IV absolute spread near the end of the year as pictured in the upper panel of Figure 13. In fact, the absolute spread fell sufficiently to become negative, indicating that in those weeks the large stores sold fresh grapefruit at retail prices under the wholesale prices the large stores paid for that fruit. This is an illustration of what is often referred to as a "loss leader," a situation for which other cases of that sort are not uncovered by the weekly data on prices and spreads of fresh citrus in the three store groups during the year investigated. In the other cases where the retail price broke sharply and heavily, such was in response to and along with simultaneous breaks, heavy and sharp, in the wholesale prices paid for the fresh citrus sold by the stores in the respective three weeks; and although the absolute spread may have narrowed, it did not become negative so as to mark a "loss leader" situation.

In their sale of fresh grapefruit, the group of small stores experienced an unusual narrowing in the absolute spread during August 1948. Then, the small stores sold fresh grapefruit at a substantially lower price than did the other stores, and the relatively low retail price was not due to a correspondingly low wholesale price paid by the small stores. The reduction in the retail price was absorbed by a reduction in the absolute spread to nearly 1 cent a pound compared with almost two and a half times that amount as the yearly average spread experienced by the small stores. Yet, in spite of the sharply reduced retail price and absolute spread, the group of small stores did not sell their fresh grapefruit during that interval at prices below the wholesale cost of the grapefruit.

We now may progress towards integrating the prices and spreads of the three store groups to discern their pricing tendencies. First, let us consider the small- and medium-sized stores. The small stores paid about the same wholesale prices as did the medium-sized stores; yet, the small stores generally sold their fresh grapefruit at retail prices usually lower than those of the medium-sized stores. This was due to the practice of the smaller stores generally receiving smaller absolute margins than did the medium stores. This set of relationships tended to prevail during both halves of the year analyzed.

The large stores averaged the lowest wholesale prices for the year as a whole, although in the second half of the year they generally experienced higher wholesale prices than did the other stores. But as to the weekly retail prices of fresh grapefruit, the large stores averaged lowest in both the first and second halves of the year. Accordingly, in the first half of the year the large stores had an absolute spread which averaged higher than that of the small stores while the reverse generally prevailed in the second half of the year. Thus, the large stores' having the lowest retail prices was due in part to their lowest wholesale prices in one part of the year and their lowest absolute spread in another part of the year. The large stores most always had the lowest retail price, but this was not due to a consistent pattern of their wholesale prices and absolute spread. The relative impacts of those two influences on the retail prices in the large stores varied during the year to a greater extent than in the small- or medium-sized stores.

With some idea as to the comparative levels of the absolute spreads in the three groups of stores, we may now turn to a review of the variability in the weekly absolute spreads as they change during the year. The measures computed in that respect are shown in Table 36. These statistical measures show that the large stores experienced greater variability in their weekly absolute spread than did the other stores. The much pronounced variability in the second half of the year for the large stores is due in large part to the sharply reduced spread for several weeks near the end of the year; but even in the first half of the year, the large stores had more variability in the weekly absolute spread. The absolute spread in the medium-sized stores was considerably more stable than that of the small stores, particularly in the first half of the year; in

the second half, the difference was much less marked. But for the year as a whole, the degree of variability in the small stores was definitely greater than in the medium-sized stores, although very much below the high degree of variability in the weekly absolute spreads of the large stores.

TABLE 36
Coefficients of Variation in Average
Weekly Absolute Spread of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	33	18	27
Group II stores	15	15	15
Group IV stores	39	91	65
All stores combined	18	17	17

Now we turn to the weekly relative spreads pictured in the lower panel of Figure 13. No pronounced trend is evident, except a very slight tendency to decline during the 1949 part of the year being considered. Aside from such trend as may exist, the general pattern over time of the weekly relative spread reflects in large part the pattern of the weekly absolute spread; yet, differences are apparent.

Relative Spreads Between Weekly Retail and Wholesale Prices of Grapefruit.--Following the same procedure used so far, we compare the average levels of the weekly relative spreads in the three store groups and for all stores combined. The comparative averages are shown in Table 37. Here again, the medium-sized stores take the position of having the largest relative spread as they did with respect to the average absolute spread. And the large stores also had the same relative position as in the absolute spread in the first half of the year, being above the small stores and below them in the second half of the year. For the year as a whole, which may be viewed as more representative of usual relationships among the store groups, the medium-sized stores had a substantially larger average relative spread than did the small or large stores; and the large stores were under the small stores, although only slightly so.

TABLE 37
Average Relative Spreads in
Weekly Retail Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	26.6	26.5	26.5
Group II stores	37.3	34.3	35.8
Group IV stores	31.6	18.8	25.2
All stores combined	33.8	29.3	31.5

To complete our descriptive review of the weekly relative spreads in fresh grapefruit, we look at their degree of variability as they fluctuate during the year. The statistical measures computed are as follows:

TABLE 38
Coefficients of Variation in Average
Weekly Relative Spreads of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
	per cent		
Group I stores	33	9	24
Group II stores	9	8	9
Group IV stores	14	111	65
All stores combined	10	14	14

As might be expected, the relationships among the store groups in the above table generally correspond to those found in the set of coefficients of variation in the weekly absolute spread. Here, too, the largest stores had the greatest variability and the medium-sized stores had the lowest variability when the data for the entire year are considered. In the first half of the year, the small stores displayed the most marked variability and the medium-sized stores the lowest, while in the second half of the year the highest degree of variability in the weekly relative

spread was in the large stores, with the small and medium stores having about equal experience on that score. Only in the medium-sized stores was the degree of variability about the same in both halves of the year, reflecting the pronounced tendency for that group of stores to avoid sharp fluctuations in the weekly relative spread from week to week.

Relations of Weekly Spreads to Prices of Grapefruit.--Following the pattern of treatment used in the previous sections on fresh oranges and lemons, we now turn to the functional relations between the spread and the prices from which it is derived and then consider the functional relations between the spread and the volume of fresh grapefruit sold at retail. Both the absolute and relative weekly spreads are considered as well as the differing situations in the small, medium, and large stores, respectively. The functional relations between the spread and the prices are embodied in the review of their behavior over time as discussed above, but now we can look at the relations from a sharper focus and attempt to measure the tendencies that prevail as well as the departures from such tendencies. At times, as will be noted later, no noticeable systematic relationships appear to exist at least in clearly discernible form.

First, we review the functional relation between the weekly absolute spreads and the weekly retail prices of fresh grapefruit during the year analyzed. The basic data are present in the scattergrams in Figure 14--one panel for the aggregate experience of all stores combined, and one for each of the three store groups. In each panel, the horizontal axis represents the weekly retail price in cents per pound, and the vertical axis represents the weekly absolute spread in terms of cents per pound. The corresponding spread and retail price of a given week are represented by a small circle or cross, the former indicating weeks in the first half of the year and the latter indicating weeks in the second half of the year. In those cases where the coordinate positions of two weeks fall on the same point in a scattergram, a small Arabic figure 2 is placed adjacent to the point indicated by a circle or by a cross.

Inspection of the four panels in Figure 14 immediately suggests the existence of a tendency for the weekly absolute spreads and the corresponding weekly prices to be positively correlated. This type of tendency was noticeable from the previous figures discussed, but now we are in a position to investigate the nature of the relationships in more detail. From

FIGURE 14 GRAPEFRUIT; RELATION BETWEEN RETAIL-WHOLESALE PRICE SPREAD AND RETAIL PRICE,
BY STORE GROUPS, WEEKLY, AUG. 2, 1948 TO JULY 30, 1949

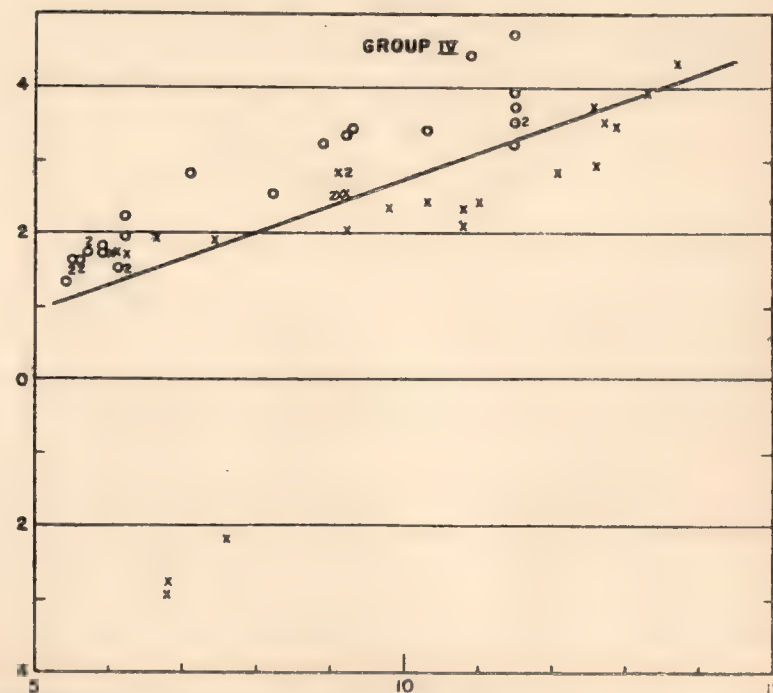
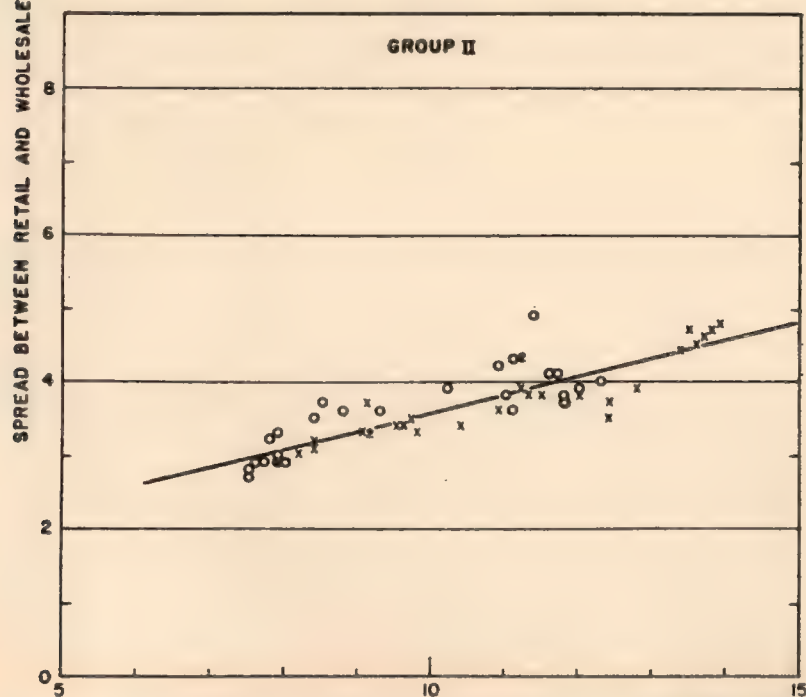
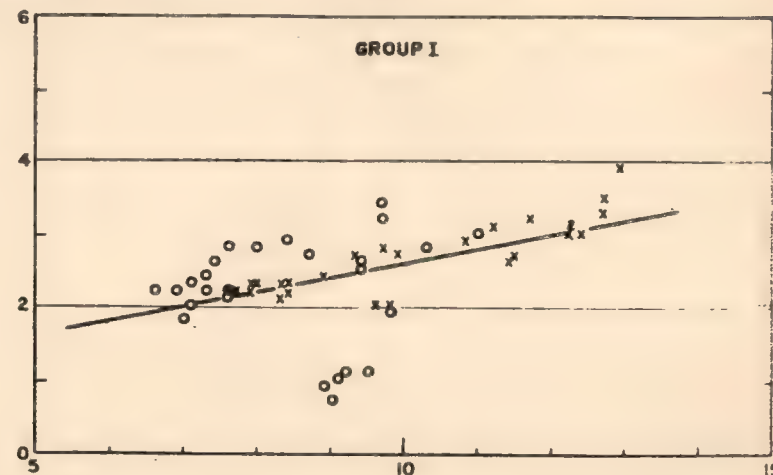
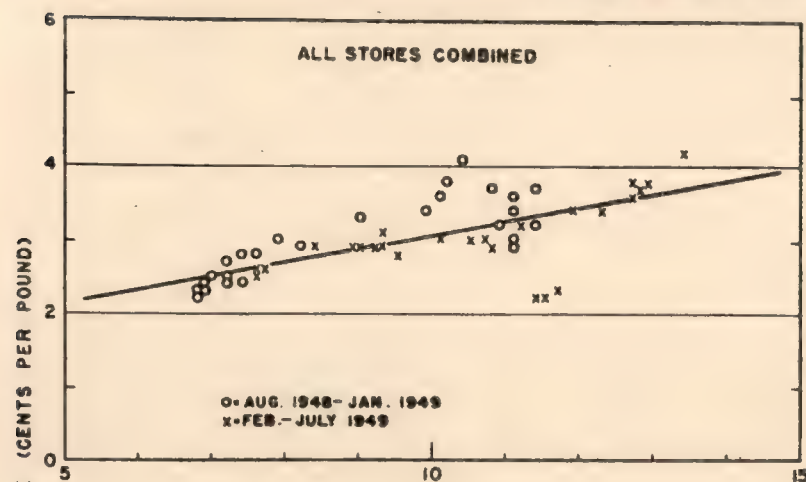


Figure 14 it is apparent that, although there is a positive correlation between the weekly absolute spreads and the weekly retail prices, there are departures from the average relationship as reflected by the scatter of the individual weeks around the lines of average relationship. Hence, it is of interest to inquire concerning the degree of correlation between the spread and prices. Indications of this are available from the following set of correlation coefficients:

TABLE 39
Coefficients of Correlation Between Weekly
Absolute Spreads and Retail Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year August 1948- July 1949
Group I stores	+0.06	+0.86	+0.52
Group II stores	+0.84	+0.92	+0.86
Group IV stores	+0.94	+0.66	+0.61
All stores combined	+0.82	+0.64	+0.68

These correlation statistics reflect the situation where the degree of relationship between the weekly absolute spread and weekly retail price varies over time. This occurred particularly in the small and large stores and also in the medium-sized stores although to a lesser extent. In the small stores (Group I), practically no correlation generally prevailed in the first half of the year, while a substantial degree of correlation prevailed in the second half of the year. The very low correlation in the first half of the year was due in large part to the four weeks when the retail price was near 9.0 to 9.5 cents a pound and the corresponding spreads were near 1 cent a pound. Those four weeks were "unusual" compared with the other weeks, and their omission would certainly raise the correlation in the first half of the year and the year as a whole. But in this investigation, a policy is followed whereby "unusual" weeks are not omitted from the analysis since such omission would warp the results which are presumed to reflect what actually happened rather than what would have been the relationship had the "unusual" not occurred. This policy is followed not only because in many cases

the distinction between "usual" and "unusual" would necessarily be arbitrary, but also because so-called "unusual" cases have occurred in all periods of years and we expect their continued reoccurrence; and their contribution to the stores and market experience must be included in the analyses if they are to reflect what actually happened and probably will happen again.

The medium-sized stores operated so that a "respectable" degree of positive correlation prevailed in both the first and second halves of the year, especially in the second half. The large stores had a very substantial correlation in the first half of the year, but the degree of correlation in the second half of the year was much less, due primarily to three "unusual" weeks in that period when the large stores experienced negative absolute spreads in fresh grapefruit or "sold at less than cost." In the first half of the year, the large stores had the highest degree of correlation between the spread and retail price, whereas in the second half of the year the medium-sized stores had the highest correlation. Since the significant features of the correlations are evident from examination of Table 39 and the scattergram panels in Figure 14, we now pass on to the next phase of the analysis.

The solid heavy lines in the panels of Figure 14 represent the respective average relationships between the weekly absolute spreads and the corresponding weekly retail prices. In each of the panels, the solid heavy line is positively inclined indicating that on the average, as the weekly retail price increases, the weekly absolute spread also increases. This average relationship is reflected in more precise terms in Table 40.^{1/}

When the data for all the stores are pooled together, we find that on the average, as the weekly retail price increases 1 cent a pound, the absolute spread simultaneously increases almost 0.2 cent a pound. The constant term in the regression equation is statistically significant in a probability sense; hence, there is no basis for suspecting that there

^{1/} When the regression coefficients in Table 40 are subtracted from 1, there are obtained the corresponding coefficients of regression of the wholesale on the retail price; and the t-ratios of the two regression coefficients are in the relationship of $\frac{t_1}{t_2} = \frac{b_1}{b_2}$.

is a constant percentage relationship between the weekly retail price and the weekly absolute spread. These generalizations apply to the data for all stores combined. Let us now look at the situation for the respective store groups.

TABLE 40
Equations of Linear Regression of Weekly
Absolute Spreads on Retail Prices of Grapefruit
August 1948-July 1949

Store group	Constant	Regression coefficient
	cents per pound	
Group I stores	+0.62 (1.44) ^{a/}	+ 0.20 (4.27)
Group II stores	+1.13 (5.32)	+ 0.24 (12.13)
Group IV stores	-0.87 (1.46)	+ 0.36 (5.50)
All stores combined	+1.23 (4.51)	+ 0.18 (6.62)

^{a/} Figures in parentheses are t-ratios.

The small stores (Group I) reflect an average relationship where, for each 1-cent increase in the weekly retail price, the weekly absolute spread increases by about 0.2 cent. The constant term in the regression equation has a t-ratio not on the threshold of statistical significance so one may suspect that, aside from sampling fluctuations, as the retail price changes by 1 per cent, the absolute spread tends to change in the same direction by an amount of about 20 per cent.

As we pass to the medium-sized stores, we find a tighter fit of the data about the linear regression line. Both the constant term and the regression coefficient are statistically significant in a probability sense. As the retail price increases by 1 cent a pound, the absolute spread increases by almost 0.25 cent a pound. There is no basis for suspecting that there exists generally a constant percentage relationship between the absolute spread and the retail price. From the view of the nature of the statistical results, the relationship between the absolute spread and the retail price is more clear for the medium-sized stores than for either the small or large stores.

With respect to the large stores (Group IV), their regression coefficient indicates, on the average, as the retail price changes by 1 cent a pound, the weekly absolute spread changes in the same direction and by an amount of slightly in excess of one third of a cent a pound. This average change in the spread for each 1-cent change in the retail price, in the large stores, is considerably greater than the changes in the spreads for the small- and medium-sized stores which do not differ from each other very significantly. One might suspect that, if the three "unusual" weeks in the large stores were omitted, their regression coefficient would be reduced and their regression line would be less tilted so that the regression relation for the large stores would approximate those of the small- and medium-sized stores. Investigation confirms such a suspect; yet, as noted earlier, we do not here follow the practice of omitting "unusual" observations. The constant term in the regression equation for the large stores is of the same order of statistical significance as the constant term in the equation for the small stores so that, for the large stores, also, there may be a tendency for the weekly absolute spread to have a constant percentage relationship to the weekly retail price.

We may conclude, so far at least, that there do exist fairly pronounced tendencies for the changes in the weekly absolute spread to be related to changes in the weekly price. Such a tendency prevails in each of the three store groups and by qualitatively or directionally similar lines if not by quantitatively similar amounts.

The next step in the analysis is to review the relations found between the weekly relative spreads and the weekly retail prices. The data and graphical relationships are illustrated in Figure 15. The four panels of Figure 15 are designed and constructed as the corresponding panels of Figure 14, explained in detail previously. The only difference is that in Figure 15 the vertical axes represent the weekly relative spread rather than the weekly absolute spread.

With inspection of Figure 15, one notes that, in the two upper panels and in the lower left panel, there is visually evident some negative correlation between the weekly relative spread and the weekly retail price. It is equally evident, by visual inspection, that the lower right panel displays only a very loose relation between the relative spread and retail price. To provide a basis for more detailed review, we set forth the following set of correlation coefficients:

FIGURE 15 GRAPEFRUIT; RELATION BETWEEN RELATIVE RETAIL-WHOLESALE PRICE SPREAD AND RETAIL PRICE,
BY STORE GROUPS, WEEKLY, AUG. 2, 1948 TO JULY 30, 1949

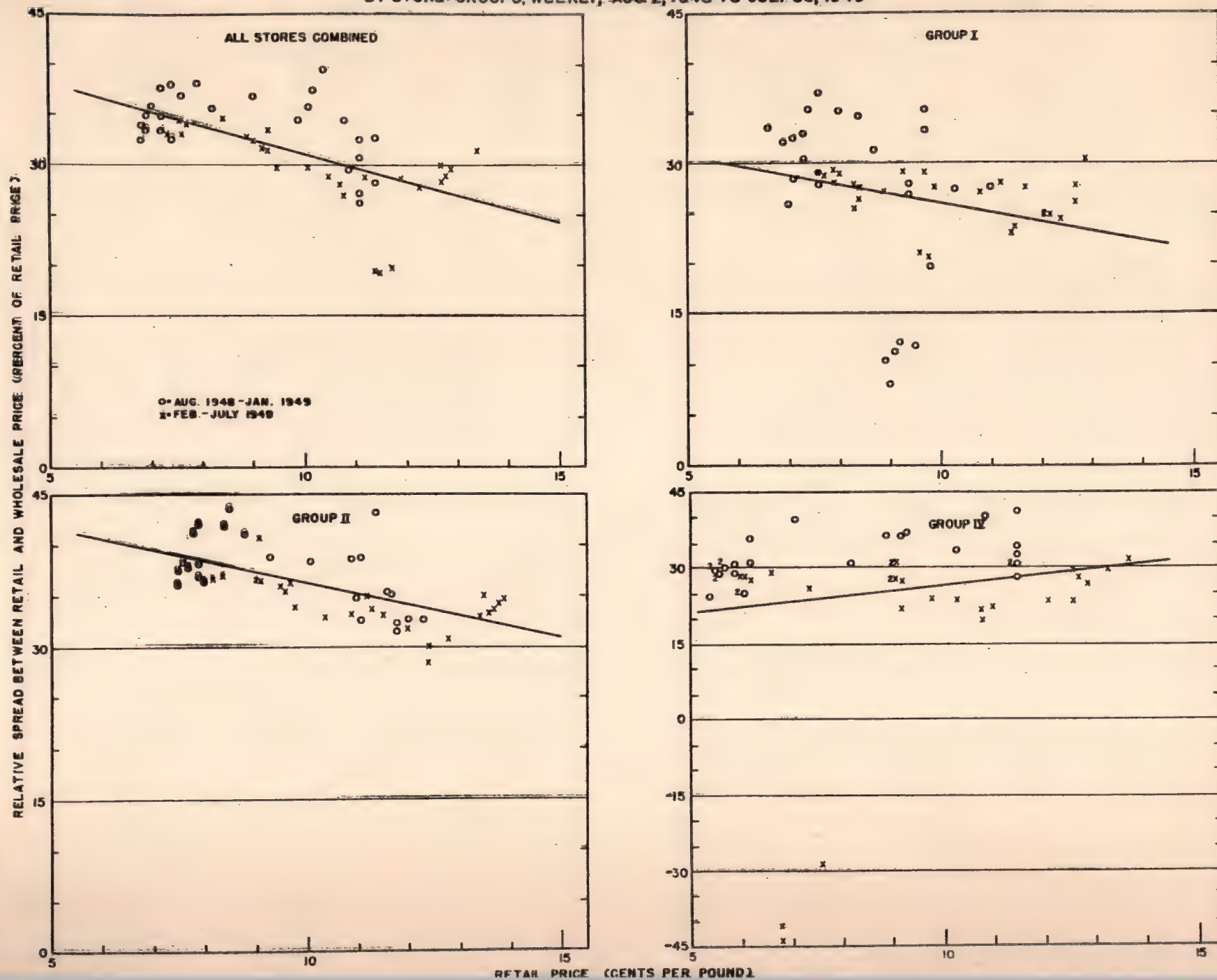


TABLE 41
Coefficients of Correlation Between Weekly
Relative Spreads and Retail Prices of Grapefruit
August 1948-July 1949

Store group	First six months, August 1948- January 1949	Second six months, February 1949- July 1949	Year, August 1948- July 1949
Group I stores	-0.39	-0.27	-0.24
Group II stores	-0.52	-0.65	-0.63
Group IV stores	+0.50	+0.37	+0.16
All stores combined	-0.47	-0.56	-0.60

When the data for all stores combined are considered, the coefficients indicate some tendency for a negative correlation indicating that the weekly retail price and the weekly relative spread tend to change in opposite directions. But the relationship does not appear to be a strong one, although it is sufficiently pronounced so that it may, say, be taken seriously. When we look at the data for the individual groups of stores, however, the situation varies.

In the small stores, there is some slight tendency toward a negative relationship between the relative spread and the retail price, although the relation is far from a strong one in either the first or second halves of the year or for the year as a whole. If there is a tendency in the small stores to use relative margins bearing a definite relation to the retail price, the tendency is apparently a weak one.

In the medium-sized stores, more than in the small or large stores, there is a definite tendency for the weekly relative spread to be negatively correlated with the weekly retail price, but even in the medium-sized stores, the tendency is only of moderate strength. This applies to the year as a whole as well as to both halves of the year, although the tendency was somewhat more pronounced in the latter half of the year than in the first half.

As we turn to the large stores (Group IV), we find what may seem as surprising results. In both halves of the year, there is a weak tendency toward positive correlation between the weekly relative spread and the weekly retail price. And when the data for the year as a whole, in the

large stores, are pooled together, we find practically no correlation. Whatever very slight positive correlation shows is due to the downward pull of the three "unusual" weeks, resulting in a slight upward tilt of the regression line. But study of the Group IV panel in Figure 15 clearly shows that essentially no correlation is apparent and that there is a very loose relationship between the weekly relative spread and weekly retail price in the large stores, in fact, so loose that no speakable amount of correlation may be said to exist. Thus, we are left with the conclusion that only in the medium-sized stores during the year being investigated was there any appreciable systematic relationship between the weekly relative spread and the weekly retail price, and in that case it was an inverse relationship.

Although the correlations between the relative spread and the retail price are very weak or essentially nonexistent for the small and large stores, we may nevertheless review the regression relations for the three groups of stores as well as for all the stores combined. The pertinent statistical measures are summarized as follows:

TABLE 42
Equations of Linear Regression of Weekly
Relative Spreads on Retail Prices of Grapefruit
August 1948-July 1949

Store group	Constant per cent of retail price	Regression coefficient
Group I stores	+34.94 (7.30) ^{a/}	-0.91 (1.78)
Group II stores	+47.03 (23.57)	-1.08 (5.71)
Group IV stores	+16.07 (1.96)	+1.03 (1.16)
All stores combined	+44.77 (17.69)	-1.36 (5.32)

^{a/} Figures in parentheses are t-ratios.

Inspection of these regression statistics indicates that, although the coefficient for the small stores may not be viewed as statistically significant, it reflects a negative change of slightly less than 1 per

cent in the relative spread, on the average, for a positive change of 1 cent a pound in the retail price. The medium-sized stores have a regression with fairly high statistical significance. The measures suggest that, as the weekly retail price increases 1 cent a pound, the relative spread decreases by an amount of slightly over 1 per cent on the average. Here, as in the correlation coefficients discussed just above, the medium-sized stores have better fitting relations than do the small or large stores.

As for the relationship found in the group of large stores, little need be said in view of the comments already made on that score. Neither the constant term or the regression coefficient is acceptable from the view of statistical significance. We can only say with some confidence that no apparent relationship was uncovered. In the group of large stores, the relative spread apparently fluctuates independently of the weekly retail price, at least so was the situation in the period investigated.

When we turn to the results based on the pooled data of all stores combined, the regressions are more attractive in terms of statistical significance. Both the regression coefficient and the constant term in the equation are acceptable in terms of statistical significance or in a probability sense. The regression coefficient for all stores combined indicates that, as the average retail price changes 1 cent a pound, the relative spread changes in the opposite direction by an amount, on the average, of about 1.4 per cent. This, along with the previous evidence, substantiates the view that, as the average retail price advances to higher levels, the average relative spread becomes smaller. The retail price level at which this tendency withers away, if it does, is not evident from the range of observations available in the data for the year analyzed.

Next we consider the relations of the weekly spreads, absolute and relative, to the weekly wholesale prices paid by the several store groups for the fresh grapefruit they sold in the respective weeks. The procedure we use follows that above in connection with the relations of the weekly spread, absolute and relative, to the weekly retail price. The statistics computed to examine relationships between the absolute spread and wholesale price are as follows:

TABLE 43

Equations of Linear Regression of Weekly
Absolute Spreads on Wholesale Prices of Grapefruit
August 1948-July 1949

Store group	Constant	Regression coefficient	Correlation coefficient
	cents per pound		
Group I stores	+1.95 (4.59) ^{a/}	+0.07 (1.14)	+0.16
Group II stores	+1.81 (7.73)	+0.28 (8.14)	+0.76
Group IV stores	+2.11 (2.95)	+0.03 (0.27)	+0.04
All stores combined	+1.95 (7.24)	+0.16 (4.02)	+0.49

^{a/} Figures in parentheses are t-ratios.

Examination of the above statistics^{1/} leads to the conclusion that for the small and large stores, respectively, very little or no appreciable correlation occurred between the weekly absolute spread and the weekly wholesale price. Also, for the small and large stores, especially the latter, the regression coefficients are not statistically significant; and aside from the question of statistical significance the weekly absolute spread appears to be quite insensitive to changes in the weekly wholesale price. Comparison of these results with the previous ones on the relations of the absolute spread to the retail price indicates that for the small and large stores the weekly absolute spread is considerably less sensitive to changes in the weekly wholesale price than to changes in the weekly retail price.

When the statistics for medium-sized stores in the above tabulation are considered, we find that the correlation between the weekly absolute spread and wholesale price is of a respectable magnitude, although less than that found between the absolute spread and retail price. In view of the statistical significance of the constant term in the regression

^{1/} When 1 is added to the regression coefficients in Table 43, there are obtained the corresponding coefficients of regression of the weekly retail price on the weekly wholesale price; and the t-ratios of the two regression coefficients are in the relation of $\frac{t_1}{t_2} = \frac{b_1}{b_2}$.

equation, there is no basis for the idea that the weekly absolute spreads and wholesale prices change by equal percentage amounts.

The regression coefficient for the group of medium-sized stores indicates that, as their weekly wholesale price changes 1 cent a pound, their absolute spread changes in the same direction by an amount of almost 0.3 cent on the average, and this average relationship is acceptable from the view of statistical significance. It may be noted here, also, that for the medium-sized stores the weekly absolute spread is about equally as sensitive, or perhaps slightly more sensitive, to changes in the weekly wholesale price than to changes in the weekly retail price.

The results for the pooled data of all stores combined include a rather moderate, certainly not strong, correlation between the weekly absolute spread and wholesale price. The regression coefficient is statistically significant and suggests an average increase of less than 0.2 cent associated with an increase of 1 cent a pound in the weekly wholesale price. This relation is of about the same magnitude, maybe slightly less, than that of changes in the absolute spread associated with changes in the weekly retail price. It is reasonably clear that in general the weekly absolute spread is more closely related to the weekly retail price than to the corresponding weekly wholesale price of fresh grapefruit.

To complete our review of the relations of the weekly spread to the weekly prices, we next consider the relative spread and wholesale price. The computed statistics are summarized in the following set:

TABLE 44
Equations of Linear Regression of Weekly
Relative Spreads on Wholesale Prices of Grapefruit
August 1948-July 1949

Store group	Constant	Regression coefficient	Correlation coefficient
	per cent of retail price		
Group I stores	+43.70 (12.77) ^{a/}	-2.51 (5.13)	-0.59
Group II stores	+47.20 (33.45)	-1.70 (8.26)	-0.76
Group IV stores	+48.42 (6.88)	-3.55 (3.46)	-0.44
All stores combined	+45.44 (27.10)	-2.08 (8.51)	-0.77

^{a/} Figures in parentheses are t-ratios.

Comparison of the correlation coefficients in Table 44 with the corresponding ones pertaining to the weekly relative spread and retail price suggests that the weekly relative spread tends to be more closely related to the weekly wholesale price than to the weekly retail price. In both cases, however, the strongest correlation occurs in the medium-sized stores and the lowest correlation in the large stores. Also, when the relationships for all stores combined are considered, the weekly relative spread has a higher correlation with the weekly wholesale price than with the retail price. It is evident that, while the correlations are not of a high order, especially for the large stores, there is a noticeable general tendency for the relative spread and the weekly wholesale price to change inversely.

In the three groups of stores, as the weekly wholesale price changes 1 cent a pound, the corresponding relative spread changes in the opposite direction by an average amount of about 2.5 per cent in the small stores, about 1.7 per cent in the medium-sized stores, and about 3.5 per cent in the large stores. Thus, the relative spread in the large stores is generally most responsive to changes in their wholesale price, while the relative spread in the small stores is generally least responsive to changes in their wholesale price. When all stores combined are considered, the weekly relative spread increases (decreases) by about 2 per cent as the average weekly price decreases (increases) by 1 cent a pound. All of the regression coefficients as well as the constant terms in the respective regression equations are statistically significant.

This completes our review of the relationships of the weekly absolute and relative spreads to the weekly retail and wholesale prices, respectively, of fresh grapefruit. The findings and relationships uncovered directly reflect the experience enjoyed or tolerated by the stores during the year investigated. Application of the relationships to other periods or conditions is subject to the same criteria as are appropriate in the use of time-series and cross-section data as a basis for generalization.

Relations of Weekly Spreads to Retail Sales of Grapefruit.--As the final part of this presentation of the empirical analysis of the spreads between the weekly retail and wholesale prices of fresh grapefruit, we now review the relations of the weekly absolute and relative spreads, respectively, to the volume of fresh grapefruit sold at retail. This review will be rather brief since the nature of the statistical results is such that they do not here merit detailed discussion.

First are presented the following correlation and regression statistics summarizing the relationships, or lack of relationship, found between the weekly absolute spread and the volume of fresh grapefruit sold weekly by the stores in the study:

TABLE 45
Equations of Linear Regression of Weekly
Absolute Spreads on Retail Sales of Grapefruit
August 1948-July 1949

Store group	Constant	Regression coefficient	Correlation coefficient
	cents per pound		
Group I stores	+2.48 (14.52) ^{a/}	-0.001 (0.352)	-0.05
Group II stores	+4.37 (42.59)	-0.011 (7.955)	-0.74
Group IV stores	+2.82 (7.28)	-0.006 (1.614)	-0.22
All stores combined	+3.52 (30.02)	-0.003 (5.130)	-0.59

^{a/} Figures in parentheses are t-ratios. In the regression analysis, the independent variable retail sales are measured in units of 100 pounds, and the dependent variable absolute spread is in units of cents per pound.

Inspection of these statistics for three groups of stores indicates that only the results for the medium-sized stores can be taken seriously in the sense that a meaningful relationship is found between the volume of fresh grapefruit sold weekly and the weekly absolute spread. In the middle group of stores, the correlation is not insignificant and indicates a negative relationship between the weekly absolute spread and the volume of retail sales made weekly by that group of stores. Associated with an increase of 100 pounds a week in the total retail sales of fresh grapefruit by the medium-sized stores in the aggregate, there tended to be on the average a very slight decrease in the absolute spread but so slight that it is hardly noticeable in terms of cents per pound. For the small and large stores, not even that amount of relationship is evident. For all practical purposes, the weekly absolute spread can be considered as changing independently of changes in the retail sales volume. Some interpreters of the data might contend that a similar conclusion applies

about as well to the medium-sized stores and, also, to the aggregate experience of all stores combined. It is clear, in any event, that the weekly absolute spread is extremely insensitive to changes in the volume of the weekly retail sales of fresh grapefruit and sufficiently so that variation in the retail volume over periods as long as a year had no direct significant impact on the level of the weekly absolute spread.

In view of the nature of the relation, or rather lack of relation, between the weekly absolute spread and weekly retail sales of fresh grapefruit, it may be of interest to inquire into the situation when the weekly relative spread is considered. This was done with the following results obtained:

TABLE 46
Equations of Linear Regression of Weekly
Relative Spreads on Retail Sales of Grapefruit
August 1948-July 1949

Store group	Constant	Regression coefficient	Correlation coefficient
	per cent of retail price		
Group I stores	+23.18 (14.47) ^{a/}	+0.05 (2.49)	+0.33
Group II stores	+33.58 (38.54)	+0.36 (2.99)	+0.39
Group IV stores	+19.45 (32.50)	+0.06 (6.15)	+0.22
All stores combined	+28.21 (25.97)	+0.02 (3.61)	+0.45

^{a/} Figures in parentheses are t-ratios. In the regression analysis, the independent variable retail sales are measured in units of 100 pounds, and the dependent variable relative spread is in per cent of retail price.

When we review these statistics, we find that, even for the medium-sized stores in contrast with the immediately preceding results, no significant correlation exists between the weekly relative spread and the weekly retail volume of sales of fresh grapefruit. The regression coefficients for each of the store groups are reasonably acceptable in terms of statistical significance, but they are generally of a very small magnitude; and this means, in view of the low correlations, that the paired data for the individual weeks bunch around a nearly horizontal line of

average relationship. Hence, there is a basis for the interpretation that the weekly relative spread, in each of the store groups, tends to fluctuate largely independently of the variations in the volume of retail sales of fresh grapefruit. Examination of the data for all stores combined yields the same conclusion. Thus, with considerable confidence may be taken the view that the weekly relative spread tends to vary independently of the volume of retail sales of fresh grapefruit. From the view of statistical nicety, it may appear disappointing that such a result emerges. There are few very high correlations or highly significant regressions and a paucity of "good fits" and pronounced relationships. Yet, from the view of learning about how the market actually operates and what in fact happens in the stores, there is much meaning in the findings that the weekly absolute and relative spreads tend to fluctuate independently of the retail sales volume of fresh grapefruit.

With the preceding materials on grapefruit at hand, we may now compare the findings for each of the three citrus fruits. Such is done in the following section, Summary and Comparison of Findings.

SUMMARY AND COMPARISON OF FINDINGS

Since fresh oranges, lemons, and grapefruit are citrus fruits, it is appropriate that this summary of findings be presented so that the common features and differences in the price relationships can be conveniently ascertained. Although the preceding sections discuss the prices of each of the citrus fruits separately, the major findings are brought together here in comparative summary form. This procedure becomes more meaningful when it is recalled that fresh oranges, lemons, and grapefruit are generally distributed by the same marketing organizations, handled by the same wholesalers, sold by the same department in retail outlets, and viewed by the trade, as well as by consumers, as belonging to the same group of products.

The behaviors of the wholesale and retail prices of fresh oranges, lemons, and grapefruit have much in common. Yet, the dissimilarities in behavior are equally as important as the similarities and even more important for some purposes. To recognize the differential behavior of the prices of the three citrus fruits is particularly significant in view of the tendency in some quarters to speak of price behavior in very broad and general terms and to suggest, or at least imply, that the prices of all or most agricultural products behave similarly on the wholesale and retail markets. As this summary unfolds, it will become evident that, even among agricultural products as homogeneous marketwise as fresh oranges, lemons, and grapefruit, there are striking differences in the behavior of their wholesale and retail prices and the spreads between them.

In this summary of major findings, as in the preceding sections on the individual citrus fruits, particular attention is given to the behavior of the spreads between weekly average retail and wholesale prices as well as the prices themselves. Results are presented on the behavior of systematic relations of the spreads to the prices and also on the nature of relations uncovered between the spreads and the volume of fruit sold at retail. Such relationships are considered separately for retail outlets classified into groups of large-, medium-, and small-sized stores and for all stores combined. Such procedure permits the comparison of price and price-spread behavior in various sized stores and aids in an understanding of pricing policies and practices in retail outlets. In

addition to providing factual information on the behavior and relations of price spreads to prices and associated sales of fresh citrus, the results of the investigation may contribute some empirical substance to the principles of price determination by business firms.

The average weekly prices of fresh oranges and grapefruit followed roughly similar patterns of seasonal variation during the year, with the low levels occurring in the winter months when the supplies and retail sales are at seasonal highs. The weekly prices of fresh lemons, in contrast, exhibited no pronounced pattern of seasonal variation; the prices followed an upward trend, although there was a hump in the prices during January-April 1949. These generalizations apply to both the weekly wholesale and retail prices.

The spreads between the weekly retail and wholesale prices, both the absolute in terms of cents per pound or the relative spread in terms of per cent of the retail price, fluctuate from week to week. Only when longer periods are considered, such as those of four to six months in duration, do the trend movements in the absolute spread correspond to those in the prices. Yet, in short-run changes from week to week, the absolute spread tends to go along with the prices especially the retail price. The weekly relative spreads in fresh oranges and lemons tend to fluctuate about a horizontal trend but with considerable short-run departure from the trend. In fresh grapefruit, the weekly relative spread followed a slightly declining trend during most of the year investigated. In the movements of the prices and spreads, there are some similarities and some differences. These are specified more precisely in the following pages.

The preceding very broad and general statements refer to the average prices and spreads for all stores combined. The particular findings can best be summarized in a meaningful way in terms of the results of the separate store groups as well as the over-all results for all stores combined. Although some of the results vary sufficiently over time so that those reflecting the first half of the year differ from those for the second half of the year, to indicate the general tendencies summarized here the results reflecting the entire year are used. Detailed results are given and discussed in the respective sections on the individual fruits. For a more complete account of the price relationships, it is necessary to review the results in the separate sections for each fruit.

Although the particular prices may not be of prime interest in themselves, when the prices of the three fruits are compared, a more meaningful picture is obtained. For weekly retail prices, the summary results are as follows:

TABLE 47
Average Weekly Retail Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	cents per pound		
Group I stores	12.2	20.6	9.2
Group II stores	12.4	20.2	10.4
Group IV stores	10.5	19.1	8.8
All stores combined	11.8	20.0	9.7

It has long been known that on a per-pound basis the retail price of fresh lemons is higher than that of fresh oranges which, in turn, is higher than that of fresh grapefruit. But such facts are not very meaningful. What is more meaningful is that in each of the three citrus fruits the weekly prices in the large stores (Group IV) averaged lower than in the other stores. When the small stores (Group I) and the medium-sized stores (Group II) are compared, however, no consistent pattern is found. In fresh oranges, the small stores had a slightly lower average retail price than did the medium-sized stores but not significantly lower. In fresh grapefruit, the small stores again had lower average retail prices and sufficiently lower to be viewed as a significant difference. But in fresh lemons, the small stores had a higher average retail price than the medium stores, although the difference was a slight one. That the larger stores averaged the lowest retail prices is less striking and unexpected than the apparent fact that the small stores, on the average, underpriced the medium-sized ones in both fresh oranges and fresh grapefruit, particularly the latter. It is reasonably clear that in fresh citrus retailing it is not generally true that the larger the store the lower the retail price. Such appears when large stores are compared with other stores. But when small- and medium-sized stores are compared, the small ones compete very strongly pricewise with the medium-sized stores.

Some students of marketing believe that price stability is a desirable characteristic from the views of producers, handlers, and consumers. Although at this point we take no position on that question, we can note how the three fresh citrus fruits compare in average variability over time in their retail prices. The summary data follow:

TABLE 48
Coefficients of Variation in
Average Weekly Retail Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent		
Group I stores	13	12	19
Group II stores	13	11	19
Group IV stores	19	15	29
All stores combined	14	13	20

The weekly retail prices of fresh grapefruit tend to fluctuate relatively more than those of fresh oranges and lemons, with the latter two citrus fruits having about the same degree of variability over time. When we look at the separate store groups, we find that the weekly retail prices in the small- and medium-sized stores have about equal variability, with that of each being substantially less than the variability in the group of large stores. The more pronounced variability in the retail prices in the large stores is due in large part to a tendency in those stores to have occasional sharp but irregular breaks in the retail price.

Since the average weekly retail prices tend to move in a substantial degree, along with the weekly wholesale prices, the average levels of the latter are of interest. The data for each of the store groups are as shown in Table 49.

The data in Table 49 indicate that the large stores (Group IV) tend to buy their fresh citrus fruit more cheaply than do the other stores, although the tendency differs for each of the three fruits. It is less pronounced in grapefruit than in oranges or lemons. The small stores, in turn, tend to pay higher prices for the fresh citrus they buy, and here again the tendency is less pronounced for grapefruit than oranges and lemons. The average wholesale prices paid by the small- and medium-sized

stores are sufficiently close that one may generalize that their average wholesale prices are the same. This does not, however, apply to oranges and lemons. There is the presumption that the wholesale price advantage of the large stores is related to the larger volumes they purchase, although it is not readily apparent why such a presumption is not so acceptable for grapefruit.

TABLE 49
Average Weekly Wholesale Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	cents per pound		
Group I stores	8.8	14.4	6.8
Group II stores	8.4	13.7	6.7
Group IV stores	7.6	13.2	6.5
All stores combined	8.2	13.7	6.7

The weekly wholesale prices of the three citrus fruits have distinguishing characteristics of variability over time as indicated in the following summary table:

TABLE 50
Coefficients of Variation in
Average Weekly Wholesale Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent		
Group I stores	12	13	22
Group II stores	13	15	22
Group IV stores	19	16	31
All stores combined	15	14	25

It is reasonably clear that the large stores tend to have greater variability over time in their wholesale prices for oranges and grapefruit than do the other stores. In lemons, the large stores have about the same variability in weekly prices as do the medium-sized stores, and each has slightly greater variability in weekly lemon prices than do the

small stores. But in oranges and grapefruit, the small- and medium-sized stores experience about the same degree of variability over time. What is particularly clear is the considerably greater variability in the wholesale prices of grapefruit compared with that of oranges and lemons. This occurred also in the variability of weekly retail prices. In fact, the pattern of variabilities in the wholesale prices corresponds closely to the pattern of variabilities in the weekly retail prices.

Although the preceding results are of interest by themselves, they take on more meaning as background information on the nature of the spreads between the retail and wholesale prices. The comparative magnitudes of the average absolute spreads for the three citrus fruits are indicated as follows:

TABLE 51
Average Weekly Absolute Spreads
Between Retail and Wholesale Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	cents per pound		
Group I stores	3.5	6.2	2.4
Group II stores	4.0	6.5	3.7
Group IV stores	2.9	5.9	2.3
All stores combined	3.6	6.3	3.0

Here the relations among the three fruits in the several store groups follow a consistent pattern. In each of the store groups, the absolute spread in cents per pound is largest for lemons and smallest for grapefruit. Oranges hold the intermediate position in each of the store groups. The medium-sized stores experienced a wider absolute spread than did the other stores, and this occurred in oranges, lemons, and grapefruit. The large stores averaged the narrowest absolute spread in each of the three citrus fruits, although in grapefruit the spread in the small stores was about as narrow as the spread in the large stores; in oranges and grapefruit, the narrowest spread in the larger stores is much clearer. What is of some significance is that the small stores clearly had narrower absolute spreads in each of the citrus fruits than did the medium-sized stores. This relationship may be viewed as some evidence contrary to the

view that the larger the store the smaller its absolute spread between its retail and wholesale prices.

The relative degrees of variability in the weekly absolute spreads between the retail and wholesale prices of the three citrus fruits are summarized by the separate store groups in the following set of variability measures:

TABLE 52
Coefficients of Variation in
Average Weekly Absolute Spread
Between Retail and Wholesale Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent		
Group I stores	17	13	27
Group II stores	14	9	15
Group IV stores	27	25	65
All stores combined	15	12	17

The medium-sized stores had the lowest degree and the large stores had the highest degree of variability in the weekly absolute spread; the small stores were in an intermediate position in this respect. All three store groups had their greatest variability in the weekly absolute spread of grapefruit, although in the medium-sized stores there was very little difference between grapefruit and oranges. Also, all three store groups had their lowest variability in the weekly absolute spread of lemons, although in the large stores there was only little difference between oranges and lemons. The substantially greater variability in the weekly absolute spreads in the large stores is related to the greater variability in their weekly retail and wholesale prices noted earlier.

The summary relations of the weekly relative spreads, in per cent of the weekly retail prices, for the respective citrus fruits are set forth in the following Table 53.

The medium-sized stores averaged slightly higher relative spreads for oranges and lemons than did the other stores; but for grapefruit,

the medium-sized stores averaged very substantially higher relative spreads than did the other stores. What is of considerable significance is the closeness in the average relative spreads of the small and large stores, and this was characteristic of grapefruit as well as oranges and lemons. It is suggested, aside from sampling variations and chance fluctuations, that for a particular citrus fruit the large and small stores experience about equal relative spreads as an average over a period of a year. While the medium-sized stores had a higher average relative spread in grapefruit than in oranges or lemons, the reverse situation held for the small and large stores. If one were interested in an over-all average relative margin reflecting the experience of all stores combined in their handling of all three of fresh citrus fruits, a figure of about 30 per cent might be viewed as reasonably acceptable. Yet, such a figure would be less acceptable for grapefruit than for oranges and lemons and would tend to be biased downward for all three citrus fruits in the medium-sized stores.

TABLE 53
Average Weekly Relative Spreads
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent of weekly retail prices		
Group I stores	29	30	26
Group II stores	32	32	36
Group IV stores	28	31	25
All stores combined	30	31	32

The price and spread relationships among the three store groups may be synthesized in the following manner to compare and contrast their pricing operations so far indicated. Although the small stores generally paid higher prices for their citrus than did the medium-sized stores, the small stores had sufficiently narrower spreads so that they were able to compete pricewise with the medium stores. For oranges and grapefruit, the small stores had lower average retail prices and higher wholesale prices than the medium stores; and for lemons, small stores had higher

retail prices but about equal wholesale prices as the medium stores. Despite the fact that the medium-sized stores bought their citrus more cheaply than the small stores, the latter accepted lower spreads so that they were able to compete, in terms of price, with the medium stores. The large stores were generally in position to have the lowest retail prices in part because they purchased their citrus most cheaply and in part because they accepted narrower average spreads than the other stores. A striking feature, however, is the extent to which the large stores had average spreads in lemons and grapefruit of about equal magnitude to those of the small stores. Apparently, it is not generally true that the small stores operate with spreads wider than other stores. Nor is it true that the retail price position of the large stores is due mainly to their willingness to accept much narrower spreads; their wholesale price position is of equal or more importance in accounting for their retail price position. In terms of gross earnings in relation to investment in the citrus fruit, the large stores seem to fare comparatively well, especially when consideration is given to their larger volume and rate of turnover of inventory. In that respect, the small stores generally do not fare as well as the medium-sized stores.

These general results are based on average prices and spreads. The nature of the relationships involved may be considered from the view of the relations of the spread to the prices and the correlation between them. Such a review begins with a comparison of the degrees of correlation between the weekly absolute spreads and retail prices.

TABLE 54
Coefficients of Correlation Between
Weekly Retail Prices and Absolute Spreads
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
Group I stores	+0.82	+0.79	+0.52
Group II stores	+0.92	+0.62	+0.86
Group IV stores	+0.83	+0.72	+0.61
All stores combined	+0.91	+0.80	+0.68

As a general result reflecting the operations of all stores combined during the year, weekly orange retail prices and absolute spreads are more closely related than are the prices and spreads of lemons, with the prices and spreads of grapefruit being least closely related. Thus, although the absolute spreads and retail prices tend generally to change in the same direction, the degree of the relationship varies among the three fruits. We also find differential degrees of positive correlation among the three store groups. The small and large stores have relationships, in this respect, similar to that of all stores combined but in different degrees. In the group of medium-sized stores, however, the highest correlation between the weekly retail prices and spread occurs in oranges, but the degree of correlation is higher in grapefruit than in lemons.

The extent to which the absolute spread tends to change along with changes in the retail price is summarized by the following linear regression coefficients:

TABLE 55
Average Change in Weekly Absolute
Spread Associated with a Change of
1 Cent in the Weekly Retail Price
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	cents per pound		
Group I stores	+ 0.30 (10.32) ^{a/}	+0.29 (9.05)	+ 0.20 (4.27)
Group II stores	+ 0.32 (0.17)	+0.15 (5.58)	+ 0.24 (12.13)
Group IV stores	+ 0.33 (10.45)	+0.38 (7.39)	+ 0.36 (5.50)
All stores combined	+ 0.30 (15.32)	+0.24 (9.60)	+ 0.18 (6.62)

^{a/} Figures in parentheses are t-ratios.

These data again indicate the lack of uniformity in the behavior characteristics of the spread in relation to changes in the retail price. Changes in the weekly retail price occur along with differing changes in the absolute spread, depending on the particular fruit and store group involved. In oranges, a change of 1 cent a pound in the retail price is associated, on the average, with a change of about 0.3 cent in the absolute spread, and this relation reflects the experience of all three store

groups, although the large stores may have a slightly greater spread effect. But such uniformity is not found in lemons or grapefruit; in lemons a spread effect of the same magnitude as in oranges is found in the small stores, a much smaller spread effect is found in the medium-sized stores, and the spread effect for lemons in the large stores is the most pronounced. For grapefruit, in the small and medium stores, the spread effect of changes in the retail price differs considerably from what occurs in oranges and lemons; but in the large stores, the grapefruit spread effects approximate closer those of the spread effects in oranges and lemons.

The findings on the relations of the weekly absolute spreads to the weekly wholesale prices also differ, depending on the particular fruit and store group considered. This is in part indicated by the following measures of the degree of relationship among the various pairs of absolute spread and wholesale price.

TABLE 56
Coefficients of Correlation Between Weekly
Absolute Spreads and Weekly Wholesale Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
Group I stores	+0.63	+0.56	+0.16
Group II stores	+0.83	+0.43	+0.76
Group IV stores	+0.61	+0.27	+0.04
All stores combined	+0.81	+0.65	+0.49

These measures, compared with those above for the correlation between the absolute spreads and retail prices, clearly show that the absolute spread is more closely related to the retail price than to the wholesale price. This applies to each of the citrus fruits and also to each of the three store groups. In lemons and grapefruit, practically no correlation is found between the absolute spread and wholesale price in the large stores.

The average effects on the spread for changes in the weekly wholesale price are of interest for comparison with the spread effects associated with changes in the weekly retail price given above. The summary data follow:

TABLE 57
Average Change in Weekly Absolute
Spread Associated with a Change of
1 Cent in the Weekly Wholesale Price
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	cents per pound		
Group I stores	+ 0.32 (5.71) ^{a/}	+0.28 (4.84)	+0.07 (1.14)
Group II stores	+ 0.41 (10.70)	+0.12 (3.39)	+0.28 (8.14)
Group IV stores	+ 0.34 (5.35)	+0.20 (2.00)	+0.03 (0.27)
All stores combined	+ 0.37 (9.75)	+0.24 (6.10)	+0.16 (4.02)

^{a/} Figures in parentheses are t-ratios.

It is reasonably clear that in each of the store groups the spread change associated with a change in the wholesale price is larger for oranges than for lemons or grapefruit. In oranges and lemons, the spread effects related to a change in the wholesale prices are nearly the same in the small stores. The spread effects appear significant for oranges and lemons in each of the store groups but significant for grapefruit only in the medium-sized stores. No consistent pattern is evident for the spread changes associated with changes in the wholesale price as compared with changes in the weekly retail price. The relationships of the absolute spread to the weekly wholesale price differ in kind and amount from the relationships of the absolute spread to the weekly retail price.

Since the weekly relative spreads have characteristics distinct from those of the weekly absolute spreads, we now summarize the relationships found between the relative spreads and the weekly prices, retail and wholesale.

First are shown the following summary measures of the degrees of relationship among the weekly relative spreads and the weekly retail prices.

TABLE 58

Coefficients of Correlation Between Weekly
Relative Spreads and Weekly Retail Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
Group I stores	+0.06	-0.08	-0.24
Group II stores	-0.04	-0.67	-0.63
Group IV stores	+0.28	+0.18	+0.16
All stores combined	-0.02	-0.42	-0.60

These data indicate that only for lemons and grapefruit in the medium-sized stores are there fairly pronounced degrees of relationship between the weekly relative spreads and the weekly retail prices, and the degree of relationship is of about the same order of magnitude for lemons and grapefruit. For the small and large stores, no significant relationships were uncovered between the relative spread and retail price. These findings fit in with the following which are concerned with relations between changes in the relative spread and retail price.

TABLE 59

Average Change in Weekly Relative
Spread Associated with a Change of
1 Cent in the Weekly Retail Price
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent		
Group I stores	+0.10 (0.40) ^{a/}	-0.09 (0.56)	-0.91 (1.78)
Group II stores	-0.04 (0.25)	-0.89 (6.37)	-1.08 (5.71)
Group IV stores	+0.61 (2.05)	+0.36 (1.29)	+1.03 (1.16)
All stores combined	-0.03 (0.17)	-0.43 (3.27)	-1.36 (5.32)

^{a/} Figures in parentheses are t-ratios.

Only the medium-sized stores show a significant relationship for lemons and grapefruit; as the retail price changes by 1 cent a pound, the relative spread changes in the opposite direction by an amount, on the average, close to 1 per cent. Nearly equivalent effects are found for grapefruit in the small and large stores, but they are less reliable in a significant sense, and practically no effect is discernible in lemons in the small stores. In more aggregative terms, when the data for all stores combined are considered, 1-cent changes in the retail price occur along with changes in the relative spread amounting, on the average, to about 1.4 per cent for grapefruit, less than 0.5 per cent for lemons, and almost no change for oranges.

As we summarize the relations of the weekly relative spreads to the weekly wholesale prices, we find the following correlation results:

TABLE 60
Coefficients of Correlation Between Weekly
Relative Spreads and Weekly Wholesale Prices
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
Group I stores	-0.23	-0.38	-0.59
Group II stores	-0.22	-0.81	-0.76
Group IV stores	-0.03	-0.34	-0.44
All stores combined	-0.21	-0.61	-0.77

There is a noticeable negative relationship between the relative spreads and the wholesale prices for both lemons and grapefruit. But the degree of relationship differs among the several groups of stores. Only for lemons in the medium-sized stores is the correlation of a respectable magnitude, and there it is higher for lemons than grapefruit, the reverse of which tends to hold in the small and large stores. The data do show that the relative spread is negatively correlated with the wholesale price, whereas the absolute spread was positively correlated with the prices. One can generalize in broad terms with the tendency varying among the store groups that as prices advance the absolute spread also increases but the relative spread tends to decrease.

To round out and complete the summary of findings on the spreads and prices, next are given the average relations between changes in the weekly relative spreads and weekly wholesale prices.

TABLE 61

Average Change in Weekly Relative Spread Associated with a Change of 1 Cent in the Weekly Wholesale Price August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent		
Group I stores	-0.55 (1.68) ^{a/}	-0.58 (2.86)	-2.51 (5.13)
Group II stores	-0.37 (1.62)	-1.24 (9.91)	-1.70 (8.26)
Group IV stores	-0.09 (0.22)	-0.95 (2.53)	-3.55 (3.46)
All stores combined	-0.36 (1.55)	-0.79 (5.44)	-2.08 (8.51)

^{a/} Figures in parentheses are t-ratios.

The above data further emphasize the extent to which spread price relationships can differ among store groups and among citrus fruits. In grapefruit, the most pronounced effect on the relative spread occurs with changes in the wholesale price in large stores and the least pronounced effect in the medium-sized stores. But in lemons, the most pronounced effect on the relative spread occurs with changes in the wholesale price in medium-sized stores and the smallest effect in the small stores. These data, as much of that above, provide little basis for making nice, clear-cut statements about the relations of the spreads to the prices which would apply with a reasonable degree of accuracy to each of the citrus fruits and to each of the groups of stores.

Leaving the relations of the spreads to the prices, we now turn to a summary of the relationships found between the weekly spreads and weekly retail sales volumes. The computed correlation coefficients, measuring the degrees of association between the absolute spreads and retail sales, are as follows:

TABLE 62

Coefficients of Correlation Between Weekly
Absolute Spreads and Weekly Retail Sales Volume
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
Group I stores	-0.66	+0.22	-0.05
Group II stores	-0.40	+0.01	-0.74
Group IV stores	-0.48	+0.04	-0.22
All stores combined	-0.54	+0.08	-0.59

Generally, as the weekly retail sales volume of oranges and grapefruit increases, the absolute spread tends to decrease. This occurs most noticeably for oranges in the small stores and for grapefruit in the medium-sized stores, but there is only a weak relationship for grapefruit in the large stores and is practically nonexistent for grapefruit in the small stores. Positive but insignificant correlations were found between the absolute spreads and retail sales volume of lemons. These differing relationships are supplemented by the following measures of how much the weekly absolute spread tends to change as the retail sales volume increases.

TABLE 63

Average Change in Weekly Absolute Spread
Associated with a Change of 100 Pounds
in the Weekly Retail Sales Volume
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	cents per pound		
Group I stores	-0.078 (3.131) ^{a/}	+0.251 (1.609)	-0.001 (0.352)
Group II stores	-0.010 (3.978)	+0.001 (0.049)	-0.011 (7.955)
Group IV stores	-0.012 (4.626)	+0.009 (0.316)	-0.006 (1.614)
All stores combined	-0.006 (5.891)	+0.004 (0.603)	-0.003 (5.130)

^{a/} Figures in parentheses are t-ratios.

For oranges, the spread changes associated with changes in the retail sales volume are significant in a statistical sense in each of the store groups, but only in the small stores does the weekly absolute spread change noticeably in a quantitative sense; in the medium and large stores, the spread change is extremely minute. For grapefruit, in the small stores hardly a perceptible change in the spread appears to be related to changes in the weekly retail sales volume; and in the medium and large stores, the change in the spread again is very minute for simultaneous changes in the sales volume. It is reasonably clear that no significant regressions were found for lemons when the weekly absolute spread and retail sales volume are considered together only by themselves; the absolute spread appears to be quite insensitive to simultaneous changes in the volume of retail sales. That raises the question whether the weekly relative spread is also sensitive to simultaneous changes in the weekly retail sales volume.

The correlations between the weekly relative spreads and the respective weekly retail sales volumes are summarized in the following set of statistics:

TABLE 64
Coefficients of Correlation Between Weekly
Relative Spreads and Weekly Retail Sales Volumes
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
Group I stores	+0.03	+0.38	+0.33
Group II stores	-0.002	+0.31	+0.39
Group IV stores	-0.30	-0.02	+0.22
All stores combined	-0.22	+0.21	+0.45

These data indicate the loose and weak relations found between the weekly relative spreads and the weekly retail sales volumes. There is not even consistency as to the signs of the correlation. A look at the following measures of relations between changes in the relative spread and retail sales volume substantiates the above findings of a weak and loose connection.

TABLE 65

Average Change in Weekly Relative Spread
Associated with a Change of 100 Pounds
in the Weekly Retail Sales Volume
August 1948-July 1949

Store group	Oranges	Lemons	Grapefruit
	per cent		
Group I stores	+0.000003 (0.22) <u>a/</u>	+1.37 (2.94)	+0.05 (2.49)
Group II stores	-0.000003 (0.01)	+0.15 (2.28)	+0.04 (2.99)
Group IV stores	-0.04 (2.22)	-0.02 (0.19)	+0.06 (6.15)
All stores combined	-0.007 (1.63)	+0.04 (1.55)	+0.02 (3.61)

a/ Figures in parentheses are t-ratios.

In all three of the citrus fruits, hardly any change in the weekly relative spread appears to be associated with changes in the retail volume; also, the directions of associated change are not consistent. In grapefruit, we find relations which are significant in a statistical sense, but the changes in the relative spreads associated with changes in the retail sales volume are so minute that they are hardly perceptible; and the associated changes occur in the same rather than opposite direction.

The differing behavior characteristics of the prices and spreads for the three citrus fruits suggest that retail merchants follow differing pricing procedures for the several fruits. To indicate types of pricing practices used by merchants with whom this subject was discussed, including some of the stores in the sample on which the study is based, the following section sets forth essential characteristics of various pricing policies and procedures.

REFLECTIONS ON SETTING OF MARGINS

The Setting.--The results presented and discussed in the preceding sections pertain to the behavior of citrus margins and their relations to the prices. Although the specific relationships set forth reflect the structure of prices of fresh citrus fruits in Denver, there may be grounds for suspecting that relationships similar in kind, if not in amount, apply to fresh citrus in other markets. Also, similar relationships, again in kind if not in amount, may pertain to fresh fruits and vegetables in general. The validity of such conjectures can be tested only by comparison of our fresh citrus results with those for other fresh fruits and vegetables in other markets as adequately comparable data become available. Yet, there still remains the question as to the rationale underlying the setting of margins. In other terms, why do certain margins tend to emerge from the merchandising and purchasing activities of sellers and buyers of fresh citrus?

The why of margin setting must be clearly distinguished from the what of margin setting. It is one thing to measure carefully the magnitude of margins and their behavior and relationships to prices, but it is another thing to have a rational explanation of what occurs. The former, comprising measurement and description, pertains to what happens; the latter, reasoning about the mental processes underlying sellers' and buyers' actions, pertains to why particular behavioristic patterns characterize buyers and sellers. The what phase of our margin studies is a necessary adjunct of the analysis, but the why phase must also be considered if margin analyses are to contribute to the understanding of price determination and behavior rather than be limited to description of the results of business behavior.

In approaching the why of margin behavior and relationships, we in essence are struggling with price theory. The well-known conventional theory of price, expounded in terms of a single firm handling a single product, does provide a rational, if not wholly acceptable, explanation of margin determination. Yet, the unsatisfactory nature of such conventional price theory is now widely recognized among students of business practices. Many price theorists are aware of the shortcomings of the usual textbook presentations and discussions. There seems to be growing

dissatisfaction with telling a student something like the following: "If the merchant at a given time knows the cost functions and the demand functions facing him, if he is concerned only with the technical short run, if he is not faced with uncertain expectations, and if his objective is to maximize net dollar income, then his appropriate selling (asking) price can be easily determined from his short-run marginal revenue and marginal cost functions." The difference between his selling and buying price would be his margin and, thus, a theory of margin determination emerges as a part of the price theory for the firm.

The recent and current economic literature on short-run price determination includes considerable criticism of the orthodox approach to price theory and the behavior of the individual firm, wherein the firm is assumed to act so as to maximize profits and does so by selling that volume at the price which is consistent with the condition of marginal revenue being equal to marginal cost.^{1/} Some economists have risen to the defense of such orthodox theory as a descriptive account of the firm if it does maximize profits. Two questions are involved. How useful and valid is the assumption that the firm does maximize (or attempt to maximize) its net profits in the short run? To what extent does the firm use its marginal cost and marginal revenue functions in its operations, specifically in setting prices and margins? These two questions have not sufficiently been distinguished. They involve different aspects of business behavior.

It is unquestionable that if the firm is to maximize its short-run profits, it does in fact operate in such a way that marginal cost and marginal revenue are equalized, even if the firm is not aware that is what happens. But whether the firm consciously attempts to maximize short-run profits in contrast with whether such an assumption is a useful one must be considered separately. Distinction also must be made as to what the firm "should do" and what it does in fact.

The recent literature on short-run price determination may be commended in that it reflects a rebirth of interest in firm behavior and operations, aspects which not so long ago were settled—at least in the

^{1/} For further comments and pertinent references to this question, see Sidney Hoos, Daily Prices and Retail Margins, Oranges, Lemons, and Grapefruit, Denver, August 1948-July 1949. Berkeley, 1954. (Calif. Univ. Col. of Agr., Agr. Exp. Sta., Giannini Foundation of Agricultural Economics. Mimeographed Report No. 168)

minds of many economists. But the literature lacks distinction in providing a solid base on which the orthodox theory of firm pricing can be tested statistically or modified in light of empirical findings. One of the objectives underlying our price and margin studies on fresh citrus is to provide some introductory empirical results, in a modest way, on pricing practices of firms. The current literature on short-run price determination is largely void of empirical support other than several very general questionnaire surveys. One thought which has been grown in the mind of the writer is that, with respect to the rationale underlying pricing policy and practice, merely asking the businessman is a weak rod on which to rely. Burrowing into his mind by asking him questions is certainly important, but it is also insufficient. It is equally necessary to inquire into what he does in fact do. In other terms, there must be a marriage between what he does, as reflected by measurement of the results of his operations, and his answers based on his knowledge and feel of his operations.

As part of the analyses of the data and results set forth in the preceding sections, discussions were had with a considerable number of the merchants whose stores were in the sample. The merchants represent owners or managers of small corner stores, medium-sized and larger independent markets, and local regional chains as well as executive personnel of supermarkets. Such discussions were reinforced by others held with owners, managers, and executives in several cities. Such discussions were oriented in the direction of learning not only what merchants do in connection with pricing practice but also why particular practices are followed. The discussions were undertaken with the objective of providing aid in understanding why various pricing policies and practices, as reflected in the behavior of the margins, tend to prevail. In simple terms, attempts were made to find out why, for example, a certain type of store generally used a margin of so many cents per pound or such a per cent of the quoted retail price. How did the merchant decide on "so many" cents per pound or "such a" per cent of the retail price, and why was that particular margin selected by the merchant? These are very simple questions for which we do not find simple answers.

It may be appropriate here to note that our investigation has not uncovered some universally valid procedure of margin setting. Also, the

inferences we make from our data and supporting information do not provide us with the basis for some unique theory of margins which applies to all types of stores. Our interpretation of the results leads us to the view that no particular procedure for setting margins is used at all times and in all places. One of the shortcomings of the recent and current discussions on short-run price determination is the implied notion that the type of firm has very little effect on its pricing practice. For instance, the economists supporting profit-maximizing marginalism tend to support its applicability to and validity for not only the "typical" firm but also for all firms viewed as "rational." On the other hand, economists in the "full cost" or the "margin over cost" school go far in the opposite direction and tend to suggest that such a pricing practice is followed by all firms in the short run. This may be an exaggerated account of the views of the two schools of thought. But there does appear to be too much universalism in both schools, with neither accepting the view that conditions and circumstances of a particular store have an important role. The diversity of conditions and circumstances surrounding retail outlets is sufficiently wide so that what would be a rational pricing procedure in one store differs from what is rational for another store. Thus, rather than seeking for a universally valid theory of product pricing, it appears more sensible to seek out the pricing procedures used by various types of stores. With such information as a base, we can begin to approach the situation where we may be able to modify the orthodox theory of product pricing to improve its usefulness as a predictive tool as well as a descriptive account of business practice.

Various Pricing and Margin Practices.—The results discussed in the earlier sections are aggregates or averages for the various types of stores in the sample. The margin relationships are average ones for the sample. Yet, in the same sample, there are various types of stores. At the expense of anticipating some of the results and materials to be issued in subsequent reports but in light of the view expressed above regarding the need for information on different pricing and margin practices followed by various types of stores, it is appropriate to sketch the pricing practices followed by various retail outlets. But for emphasis, we here repeat again that the following sketches pertain to the pricing of fresh citrus as interpreted from the data analyzed in conjunction with

detailed discussions with merchants as noted earlier. What we indicate as applying to fresh citrus, however, need not be applicable to the retail sale of automobiles, washing machines, hats, shoes, or the many other items sold at retail. Thus, the type of product as well as the type of store may influence the policy and practice of product pricing.

Retail outlets handling citrus may be and usually are classified in terms of type of store and volume of business; thus, we speak of the small independent, the supermarket, the corner grocery, the "service" store or the "self-service" store, the independent market, or local chains and national chains. There is a mixture of type of ownership and dominant characteristics of the store. Although there may be a correlation between type of store and its pricing policy, there is no logical reason why the relationship need always hold. In fact, our citrus studies indicate it does not. For that reason and for now, we shall set the framework as one of different types of pricing practice; and later reports will be concerned with the relationship of particular types of pricing practice to particular types of stores.

One other word need be noted before making our sketch of the pricing- and margin-setting practices uncovered in our investigations of citrus prices and margins. Although some of the pricing procedures may appear naive or even crude to the outsider, some merchants actually use the procedures and "make money"--as they put it--in using these procedures. Some of those merchants have made money year in and year out during good times and bad. They may have made less money than would have been made if they used other pricing procedures. But it is doubtful that only firms which attempt to maximize profits do in fact earn profits over the years and survive. Other firms also earn profits and survive. No unique relation need exist between the level of profits which a firm in fact realizes and the degree of apparent sophistication in its setting of prices and margins. Simplicity or apparent crudity in margin setting does not appear to be a reliable index of profit earning or survival power of the firm. For what may seem to the reader or investigator to be a crude or simple procedure may in fact be the end result of a complicated process in the mind of the merchant who often may not himself be consciously aware of that process as it develops and unfolds in his head.

Some retailers of fresh citrus follow the practice of consistently using a fixed margin of so many cents per pound (or per dozen). For example, if their purchase price is 9 cents per pound, they set the retail price at, say, 13 cents per pound, using the fixed margin of 4 cents per pound. If their purchase price is 12 cents per pound, the retail price is set at 16 cents per pound. And, if the purchase price is 7 cents per pound, the corresponding retail price is 11 cents per pound. The fixed margin of a certain number of cents per pound, in our example 4 cents, is applied invariably and remains fixed for a considerable period of time; the citrus margin studies include data for some stores which used nearly a fixed margin of so many cents per pound for as long as a year or the entire period of the study.^{1/}

The fixed absolute margin procedure just described is used more by the small- and medium-sized stores where a single individual, the manager or most frequently the owner-manager, does the buying, most if not all the selling, and also the setting of prices. With many products with which to deal, the procedure has the advantage of simplicity and ease in application. The owner-manager need only add his fixed cents-per-pound margin to his purchase price to arrive at his retail price for the fruit, a quick mental operation performed without the need of even pencil and paper. Thus, ease in application is a major advantage of this procedure for some stores.

In the use of the fixed absolute margin, however, the resulting retail price may not be one which yields short-run maximum profits to the store, although profit maximization can result at some times. The merchant is generally aware of this situation, but he may be willing to forego short-run maximum profits in favor of other benefits. This problem of how a particular margin is selected for use by the store will be considered later. Here it suffices to note that the use of fixed absolute margins is not an unusual procedure applied by stores, even if its results generally are not consistent with the conditions of money profits maximization.

^{1/} In the case of a fixed margin of so many cents per pound, the equation showing the relationship between the wholesale and retail price is

$$p_r = m + p_w$$

where p_r = the quoted retail price, p_w = the wholesale price paid by the retailer, and m = his margin in cents per pound.

The application of a fixed absolute margin by a store results in its retail price being tied rigidly to the store's purchase price. Thus, variation in the wholesale price is the unique determinant in the variation of the retail price. Both prices move up and down together and by the same number of cents per pound independently of the level of the wholesale price. The changes in retail price are not only highly sensitive to the changes in the wholesale price, but both changes are equivalent whether the wholesale price is relatively high or low. But whether, in the longer run, the store sells more or less fruit than it would with another procedure of margin setting cannot be deduced alone from the fact that the store uses a fixed absolute margin. The same applies to the effect on the store's profits from the handling of fresh citrus.

A second method of setting retail prices of fresh citrus may be referred to as the fixed percentage margin procedure. Here, the retailer sets his quoted retail price so that it bears a given fixed proportionate relation to the wholesale price he pays. The percentage margin is invariant with respect to the wholesale price paid by the store.^{1/} The fixed percentage margin may be in terms of the retail price or in terms of the wholesale price, although to yield equivalent profits in cents per pound the fixed percentage is different when in terms of the retail price than when in terms of the wholesale price.

This procedure of using a given fixed percentage of, say, the retail price is widely used. Trade papers and journals have for a long time discussed it and frequently published comparative percentages for various sized and types of stores with the suggestion, or at least implication, that the "appropriate" percentage margin is related to the volume of business done by stores. With this point, we shall be concerned later. Here we note that for a given store, during a given period, the practice of setting retail prices of fresh citrus with the use of a fixed percentage margin is a widely

^{1/} In the case of a fixed percentage margin (as per cent of the retail price), the equation showing the relationship between the wholesale and the retail price (both in cents per pound) is:

$$P_r = \frac{P_w}{1 - k}$$

where p_r = the quoted retail price (in cents per pound), p_w = the wholesale price paid by the retailer, and k = his margin fixed in terms of per cent of the retail price. If k is fixed in terms of per cent of the wholesale price, the equation is $p_r = (1 + k)p_w$.

followed one. In fact, it is known that many citrus retailers have a small handy chart from which can easily be read the "appropriate" retail price per dozen corresponding to the wholesale purchase price per box and the fixed percentage margin desired. Such charts or essentially similar ones are widely used, thus eliminating the chore of pencil figuring for the merchant. Even without a chart, he can very easily figure by simple arithmetic his retail price. Hence, simplicity and ease of use are features also of the fixed percentage margin method of setting the retail price of fresh citrus.

As with the fixed absolute margin, the fixed percentage margin procedure yields a retail price which is directly tied to the merchant's wholesale price. As the wholesale price varies, the corresponding retail price also varies but not by the same amount in terms of cents per pound. As the wholesale price varies from a relatively low level, the retail price also varies but by a smaller amount in cents per pound than if the wholesale price varied from a relatively high level. Thus, as the wholesale price increases the retail price also increases but by a larger number of cents per pound. The retail price retains its constant percentage relation to the wholesale price, although there is a changing cents-per-pound relation to the wholesale price as it varies. A result of this relationship, the fixed percentage margin method, is that margins in cents per pound are wider at higher price levels than at lower price levels. This is one feature which attracts merchants to the fixed percentage margin method of setting retail prices. During periods of a comparatively high general level of prices, when operating costs are relatively high, merchants feel that margins in cents per pound should also be higher to provide an area of gross earnings from which to meet the increased costs of doing business. Although this view is not a universal one, it does have many proponents among retail merchants of fresh citrus.

The fixed percentage margin method of retail pricing need not and probably generally does not yield retail prices and sales which result in short-run profit maximization for the merchant. For the short run, maximum profits from the application of the fixed percentage margin result only as a special case which could be attained if an appropriate volume of sales is attained; generally, or without the appropriate volume, short-run maximum profits will not result. But this need not deter the merchant from using this method in view of its other characteristics and advantages

for him. Whether the method yields maximum profits in the longer run is still a mute point.

Another retail price-setting procedure involves the use of a cents-per-pound margin which varies with the store's purchase price. In this case, the absolute margin is a linear increasing function of the wholesale price.^{1/} A variation of this procedure is one whereby the store uses a percentage margin which varies with the store's purchase price. In this case, the percentage margin is a linear function usually but not always negative with respect to the store's wholesale purchase price.^{2/} Both of these procedures differ substantially from their counterparts of a fixed absolute margin or a fixed percentage margin.

When the margin is functionally related (usually linearly) to the wholesale price, there is somewhat less simplicity and ease in retail price setting for the store. However, the computation involved is not burdensome, and convenient easy-to-use charts can be made available for use in determining the retail price consistent with a given functional relationship. Many smaller stores do not tend to use the procedures of having their margin (absolute or percentage) vary as a function of the wholesale price. To the extent that such procedures are used, they are found in the larger stores where more sophisticated price-setting methods prevail. It may be noted here, however, that the case of fixed percentage margins sketched earlier may yield retail prices equivalent to those obtained by having the absolute margin vary as a function of the wholesale price; this would depend on the particular levels of fixed percentage margins and functionally varying absolute margins involved. Whether a store uses one or the other of those two procedures cannot generally be uncovered only by the statistical relationships between the margins and prices; discussion with the price setter as to his intentions and procedures must also be relied on.

^{1/} The relation between the retail and wholesale price is:

$$p_r - p_w = a + bp_w \text{ or } p_r = a + (1 + b)p_w$$

where p_r = the quoted retail price, p_w = the store's purchase price, and a and b are parameters. The parameter b is usually positive in line with the absolute margin increasing directly with p_w .

^{2/} The relation between the retail and wholesale price is:

$$\frac{p_r - p_w}{p_r} = a + bp_w \text{ or } p_r = \frac{p_w}{(1 - a + bp_w)}$$

Both the varying absolute and percentage margins, in terms of being functionally related to the wholesale price, may but generally would not yield short-run profit maximization. In special cases maximum profits can result, but those stores which use either of the two procedures do not appear to do so in order to arrive at a profit-maximizing price.

The retail price- and margin-setting procedures sketched so far may be characterized as systematic methods. A definite procedure is involved, and the relationships between the retail and wholesale prices may be expressed by equations. Such systematic methods are not uncommon among retailers selling fresh citrus. The studies of stores which this sketch reflects include the experience of merchants some of whom used one procedure during the year and some of whom used another procedure during the year. Some stores used one procedure for a period of weeks or months then shifted to some other procedure. But such stores invariably used a systematic method which at least had a particular quantitative relationship between their retail and wholesale price.

There are other stores, however, whose price setting did not involve a systematic procedure of the type sketched above. This is not to say that such stores had no pricing system; they did, but it was of a different nature.

Some stores set their retail prices for fresh citrus by following closely the prices of their near or strong competitors. Such a store would act as a price follower and would set its retail price for comparable grades and qualities the same as the store it viewed as the price leader or price setter. This procedure may be characterized as one of "meeting competition." Such a method carries with it at least the implication that the price follower in the longer run buys his citrus at prices which permit him "to sell at competitive prices."

Meeting the price set by the nearest or strongest competitor, however, is only one method of several in this category. Some stores have the policy of setting their retail price so that it is a certain amount under that set by the store viewed as the price setter; and other stores set their retail prices so that they will be a certain amount above that of the price-setting store. This "shading" under or "padding" over the price quoted by a "competitor" can take the form of special sales, week-end bargains, or be followed consistently day in and day out. All of

these cases, where the primary factor of retail price setting is "What is competition doing?" characterize a smaller minority of stores. Most stores follow one of the procedures sketched earlier, even if they may not always be rational or optimum procedures for the particular store.

It may merit emphasis that disparaging thoughts may not be appropriate with respect to the pricing procedures of "following competition." At first thought, such procedures may be considered as crude, irrational, and unsophisticated. Yet, with deeper probing, it becomes evident that such may not be the case. From the view of earning profits, stores following such procedures can fare as well as those stores which adhere to some rigid quantitative formula for setting retail prices. The particular method of setting retail prices is not very meaningful by itself unless appropriate knowledge and information are brought to bear on the method and its application. Thus, the problem of margin and retail price setting involves criteria for judging and selecting "appropriate" margins and retail prices. What is "appropriate" for one store in one set of conditions need not be appropriate for the same store with another set of conditions or a different store with its own peculiar conditions.

Short-Run Profit-Maximizing Margins for Single Products.--The problem of "appropriate" margins brings us again to the question of short-run profit maximization to which we have referred a number of times in the preceding comments. It is clear that any one of the margin- and price-setting methods sketched above may at particular times be consistent with profit maximization, even if the merchant is not so aware. Whether profit maximization is achieved depends not on the particular pricing method used but on whether the resulting price and quantity relation is such that it is equivalent to that called for by the formal conditions which must be met for maximum profits. If a merchant were to know his relevant cost and revenue functions and if his objective were to maximize profits in the short run, his retail price would bear a certain relation to his wholesale price. Thus, he has a particular or specific margin consistent with profit maximization. Such a profit-maximizing margin can be arrived at by means other than formal marginal analysis. But whether the extent to which margins do in fact approach those consistent with profit maximization can only be conjectured unless the relevant short-run cost and revenue functions for individual stores are available.

The issues involved in the practice of margin setting in its relation to profit maximization may perhaps be brought to a sharper focus by explicitly setting forth the conditions to be met by short-run profit-maximizing margins. To further sharpen the issue, we shall be concerned with maximizing short-run gross profits; by introducing cost functions, if they are known, for operating expenses, the short-run maximum net profits can be considered. For our purpose, the use of gross profits (the realized margin in cents per pound times the number of pounds sold) is adequate for now.

Let us consider gross profit-maximizing absolute and percentage margins, respectively. In the general case, where there is nonpure competition from the view of the store, in both the buying and selling of the fresh citrus, the gross profit-maximizing absolute margin reflects and is influenced by the store's demand-price and cost-price flexibilities.^{1/} In other terms, the usual marginal-revenue-equals-marginal-cost condition can easily be converted so as to express the gross profit-maximizing absolute margin as a function of the wholesale price and the respective flexibilities of the wholesale and retail prices. Thus, if the merchant knew or even had a hunch or "feel" of those flexibilities under which he operated, he could approximate the absolute margin-maximizing gross profits. If he purchased his fresh citrus under conditions of pure competition, he need be concerned only with one of the flexibilities--that of his sales price. Whether, in fact, some merchants have a good hunch or feel of their price flexibilities is another question and yet to be considered.

If the gross profit-maximizing relative margin (in this case, absolute margin as per cent of the wholesale price) is considered, it may be expressed as a function of the flexibilities of the retail and wholesale prices. When the merchant is considered as buying his fresh citrus under

^{1/} If the gross profit function is $\pi = (p_r - p_w)q$, where p_r = the retail price, p_w = the wholesale price, and q = the volume of sales per time unit; e_r = demand-price flexibility = $\frac{dp_r}{dq} \cdot \frac{q}{p_r}$; e_w = cost-price flexibility = $\frac{dp_w}{dq} \cdot \frac{q}{p_w}$; then, the gross profit-maximizing absolute margin = $(p_r - p_w)^* = p_w \left[\frac{1 + e_w}{1 + e_r} - 1 \right]$, and $p_r^* = p_w \left[\frac{1 + e_w}{1 + e_r} \right]$.

pure competition, this gross profit-maximizing percentage margin turns out to be equal to a function of the store's retail price flexibility. Thus, if a particular store were known to be buying under pure competition and to be setting its percentage margins so that it would be maximizing gross profits, from those percentage margins could be deduced acceptable measures of the store's demand-price flexibilities and their reciprocals would be acceptable measures of the store's demand-price elasticities. The validity of using a store's percentage margins as indicators of its demand-price elasticities or flexibilities, however, depends upon the extent to which the store maximizes its gross profits and also upon whether the store purchases under conditions of pure competition.

Going a bit further in relating margins to other economic measures, a relationship may be shown between the absolute margin, returns to the store, and its volume of sales.^{1/} Profits, after payment for the fruit but before other costs, are at a maximum when the demand-margin elasticity is unity (negative under our assumptions) and the marginal profit function is equal to zero. These relations are briefly indicated only to emphasize that, for purposes of analysis and investigation, margins may be recognized as indicators of market value or the market-determined value of the services performed in transferring the product from one stage in the marketing system to another stage--in our case from the retailer of fresh citrus to the final consumer. As for other economic variables, there are equilibrium values for margins; but also, as for other economic variables, wholesale and retail margins need not be at or near the profit-maximizing equilibrium points, and the result for the economic system is qualitatively similar to that when other prices diverge from their theoretical equilibrium or "optimum" values.

We have sketched some background about the nature of the results of our wholesale and retail margin studies on fresh citrus and the relations of absolute and percentage margins to those consistent with maximum gross

^{1/} $\pi = sq$, where π = total revenue after deducting the cost of the fruit, s = the absolute margin or $p_r - p_w$, q = the volume of sales. Then, $\frac{d\pi}{dq} = s(1 + e_s)$ where $e_s = \frac{ds}{dq} \cdot \frac{q}{s}$ or the demand-margin flexibility, and $s(1 + e_s)$ represents a marginal profit (after deducting cost of the fruit) function.

profits so that we can inquire into the extent to which the fresh citrus margins do in fact correspond, at least approximately, to "optimum" (profit-maximizing) values. Here we are concerned with an analytical framework of analysis so that empirical content can be contributed to the question concerning the extent to which merchants, even if they do not practice marginalism explicitly and openly, do operate in such a way that their pricing results approach those of profit-maximizing procedures. Before such empirical content can be adequately examined, however, further results on the behavior of margins in relation to the wholesale and retail prices and quantities bought and sold must be considered. Also, the margin experience of individual stores must be examined since the data and results presented here are in terms of aggregates or averages for groups of stores. But the foregoing discussion of margins and their relation to pricing practice is called for here to help develop the background for the study as a whole and also to provide some analytical framework for the statistical relationships of the type presented and discussed in this report and in other ones.

For purposes of orientation and in order to indicate some uses and interpretation of data on absolute margins, let us consider equations expressing average relations between absolute weekly spreads and retail sales volume for several store groups. From such equations can be computed profit-maximizing volumes for the several store groups.^{1/} Such computed volumes may then be compared with those actually experienced by the stores. If the computed and actual weekly volumes show close

^{1/} The respective equations for the three groups of stores are as follows, where $(p_r - p_w)$ = the average weekly absolute spreads in cents per pound and q = the average weekly volume of retail sales (in units of 100 pounds) for the indicated store group in the sample, and the data reflect average experience for the entire year of the study.

Small stores: $(p_r - p_w) = 4.4239 - 0.0775q$

Medium stores: $(p_r - p_w) = 5.1625 - 0.0097q$

Large stores: $(p_r - p_w) = 4.6675 - 0.0122q$

From each store group's equation, $(p_r - p_w) = a_1 - b_1q_1$, is obtained the gross revenue (net of the cost of the fruit) function and the corresponding marginal revenue function, $MR_1 = a_1 - 2b_1q_1$, which is solved for q_1^* , the gross profit-maximizing volume per store group per week; that volume is then divided by the number of stores to obtain the gross profit-maximizing volume, average per store per week.

correspondence, the data and results provide a basis for the inference that the margins used by the store are consistent with price setting to yield maximum gross returns net of the cost of the citrus. When this test is applied to the aggregate experience of the store groups in the sample, the results are as follows:

TABLE 66
Actual and Gross Profit-Maximizing Volumes of
Orange Sales Per Store, Per Week
August 1948-July 1949

Store group	Number of stores	Average number of pounds per store group per week		Average number of pounds per store per week		Actual as per cent of gross profit maximizing volume per store per cent
		Actual	Gross profit maximizing pounds	Actual	Gross profit maximizing	
I, small stores	14	1,159	2,854	83	204	40
II, medium stores	33	11,579	26,611	351	806	44
IV, large stores ^{a/}	8	14,125	19,129	1,766	2,391	74

^{a/} Includes five chainstore outlets not in basic sample. See p. 4.

These results at first sight suggest that none of the three groups of stores, each in terms of average volume per store per week, followed a policy of setting the absolute margin so that the sales volume is consistent with maximizing returns over the cost of the citrus. Such may be the case but it differs from the maximization of net profits, as noted below, where some evaluation of this type of analysis is set forth. But it is of perhaps first importance to note here the degree to which the store groups tend to approach gross profit maximization in their margin setting as they increase in size. When the actual volumes of orange sales per store per week are expressed as a per cent of the corresponding computed volumes which would maximize gross revenue, net of the cost of the fruit, the percentages are: small stores, 40 per cent; medium stores, 44 per cent; and large stores, 74 per cent. It may well be that the large stores, when account is taken of short-run variable costs they may have, do approximate fairly closely the maximization of net profits from the sale of fresh citrus. If their short-run variable costs and especially their marginal costs for items other than the fruit are an increasing function of volume, there would be a tendency for the net

profit-maximizing volume to be smaller than the volume which maximizes gross returns over the cost of the fruit. Thus, it is fully within the realm of acceptance that the large stores in the sample tended to follow a rational policy in setting margins in the sense that the stores approached profit maximization from the sale of fresh citrus. There appears to be less basis for such a statement to apply to the small- and medium-sized stores.

The analysis summarized just above is suggestive with respect to the rationale of margin setting but not fully adequate for empirical testing of the practice of net profit maximization. One limitation has already been mentioned. Gross returns over the cost of the fruit are considered, and costs other than fruit costs are neglected. When costs other than for fruit can be reflected by functions with respect to volume, they could be included in the analysis to test the practice of setting margins so as to maximize net profits rather than net returns over the cost of the fruit.

Long-Run Profit-Maximizing Margins for Multiple Products.—We have so far considered citrus margins, specifically those between the retail and wholesale prices, although the analysis can be broadened to include other margins in the marketing system. There is the question as to whether merchants in their setting of margins think of oranges, lemons, and grapefruit independently and separately. Or are the three separate citrus fruits considered as a group, with the merchant handling the margin problem as one in multiple products? Does he in practice generally or infrequently reduce, say, his margin on fresh oranges to attract trade but compensate by correspondingly adjusting his margin on lemons or grapefruit? In other terms, does the merchant set and adjust his margins on each of the three citrus fruits so as to approach maximization of profits or to approach a given return from the total of his fresh citrus business?

The question of whether margins are established by single products or by groups of items in the sense of multiple products is a pertinent one but for which empirical investigation is yet at an unsatisfactory stage. In fact, there may be reasonable grounds for expecting that the multiple products approach is used by many merchants in setting their fresh citrus margins, at least by "hunch," "experience," and "intuition"

if not by some quantitatively precise procedure. Discussions with a considerable number of merchants suggest such a view.

Some merchants, at least in their thinking, go even further and contend that margins for fresh oranges, lemons, and grapefruit are not considered independently or even as a closed group of multiple products. Rather, the margins for all fresh fruits and even for all fresh fruits and vegetables are balanced or adjusted among each other so that a certain level of profits can be attained from the entire department. Such a method of price and margin setting is rather sophisticated and approaches a general equilibrium system for the fresh fruit department or the fresh produce department. It is clear, however, that in such a case the merchant cannot use an explicit price- and margin-setting system with its structure based on formal equations providing precise relations between the margins, prices, and anticipated volumes of sale. Practical considerations dictate that, when a fresh fruit or fresh produce department including from 12 to as many as 25 separate items, a not uncommon situation, is operated on a multiple products basis in the setting of margins so that they are interbalanced to approach a certain level of profits for the department as a whole, it is necessary that the "experience" and "intuition" play the dominant role in margin setting. The sheer computational difficulties in using a quantitatively sophisticated system for setting margins must preclude its use by most stores. The rapid pace at which the fresh fruit and vegetable markets operate, with their seasonal items and with violently changing conditions of supply and price, means that, if complicated interproduct margin analyses were made by a computational system, recomputations would have to be made frequently, daily during some parts of the year. The additional costs involved would likely outweigh the gains above those earned from a less complicated and precise system. These views, which at least on the surface seem plausible, reflect the expressions of some experienced and successful merchants rather than being based on empirical investigations.

There are cases, however, where many merchants do utilize what is in effect the multiple products approach in their setting of margins and prices. An obvious case is where, in fresh oranges or fresh lemons, two or more sizes or grades are intermixed and marked for sale from the same bin at the same retail price. Where the separate sizes or grades cost

the merchant different prices but he intermingles the products and sells them at equivalent prices, he is in fact using a simple procedure of counterbalancing the margins; and, presumably, such is done to yield greater total returns than would result from pricing and selling each size or grade independently of each other. That type of margin and price setting by a system of multiple products is simple to operate and on which to figure the margins and anticipated returns for comparison with costs. The product mix is fixed, giving fixed technical coefficients of sale; from the view of making the sale, receiving the gross returns, and computing the net returns above the cost of the fruit, the transaction is similar to where two units of the same grade or size are sold. But our interest in multiple products setting of margins and prices is oriented more in the direction of those cases where the individual products maintain their identity in retail sale and they are viewed by the merchant as having separate, even if related, retail demand functions.

The previous sections of this report were concerned with the measurement of wholesale and retail margins and quantitative analysis of their behavior and relations to the prices and volumes sold. This section so far has been concerned with the rationale and practices of setting margins. Various systems of margin setting were sketched and reviewed in terms of their characteristics and relation to economic concepts such as demand-price elasticities, flexibilities, and profit maximization. It was recognized that different procedures of margin setting are used by different merchants, and some of the procedures may yield results which at times approach those of profit maximization. In that respect, some meager evidence was considered as to whether for store groups there appears to exist a tendency for the size of the store to be directly related to the achievement of profit maximization. Yet, no explicit evidence was presented that even the large stores as a group set profit maximization as an objective goal intended to be reached by the manipulation of margins. The experience of individual stores, it was suggested, must be evaluated to investigate further the extent to which profit maximization is an explicit objective of citrus retailers.

Now that we have given some attention as to what the average margins are for various store groups, what their quantitative relations are to prices and volumes, and what their relations are to profit goals

of which maximization is only one case, there is the further question as to why wholesale and retail price margins tend to approach particular levels. In simple terms, "Why do merchants do what they do?" in their selection and setting of margins.

If profit maximization is accepted as the margin-setting objective of a store, there is no further question as to why the store uses particular margins. The attainment of maximum profits requires the use of certain margins. Thus, the store uses those particular margins because they are necessary to attain maximum profits. But as the evidence so far available suggests, most stores do not attain a goal of short-run maximum profits in the sale of fresh citrus, that is, when viewing profits from citrus alone. It is unquestionable whether the failure to reach short-run maximum profits from citrus is unintentional on the part of the store. A more acceptable conjecture is that the store strives to reach some particular level of long-run profits which the store views as its long-run maximum in light of its over-all situation and potential earnings from other products as well as fresh citrus. This is a conjectural hypothesis based on our analyses including discussions with various types of merchants. Data to check empirically and statistically the acceptability of the hypothesis are yet unavailable, despite the substantial amount of quantitative information already compiled on the margins of other products as well as fresh citrus. Yet, at the present stage of investigation, the hypothesis seems reasonable in view of what we are learning about practices in margin setting and in view of what is logically acceptable in the sense of price theory.

TABLE 67

Oranges: Weekly Retail and Wholesale Prices and Retail Sales Volume
by Store Groups, Denver, August 1948-July 1949

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole- sale				Retail	Whole- sale				Retail	Whole- sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
1948														
August 7	I	13.3	9.5	10.9	September 18	I	12.1	8.6	10.3	October 30	I	11.7	8.4	11.9
	II	13.2	9.1	95.0		II	13.0	8.6	103.9		II	11.7	7.5	124.8
	IV	10.3	7.3	126.0		IV	11.2	8.0	133.8		IV	10.0	6.3	114.4
		12.4	8.7	231.9			12.3	8.4	248.0			11.2	7.3	251.1
August 14	I	12.4	9.2	12.2	September 25	I	11.8	8.7	11.4	November 6	I	10.3	7.7	12.3
	II	13.2	8.9	87.2		II	13.2	8.8	97.4		II	11.3	7.1	128.5
	IV	10.7	7.3	115.5		IV	11.5	8.1	108.5		IV	7.7	5.5	126.9
		12.3	8.5	214.9			12.4	8.6	217.3			10.0	6.8	267.7
August 21	I	11.8	9.1	11.8	October 2	I	12.5	9.0	9.6	November 13	I	9.8	7.0	11.9
	II	13.4	9.1	100.2		II	13.5	9.0	104.4		II	10.1	6.4	127.6
	IV	11.1	7.5	105.4		IV	11.5	8.0	113.6		IV	7.5	5.2	151.9
		12.4	8.6	217.4			12.7	8.7	227.6			9.3	6.2	291.4
August 28	I	11.9	9.1	12.2	October 9	I	12.6	9.8	8.4	November 20	I	10.5	7.2	11.9
	II	13.3	8.9	104.6		II	13.1	8.8	78.0		II	10.3	6.5	130.2
	IV	10.9	7.5	107.2		IV	11.7	8.0	115.0		IV	6.9	5.4	148.6
		12.3	8.5	224.0			12.6	8.6	201.4			9.4	6.3	290.7
September 4	I	11.7	8.5	10.8	October 16	I	11.1	8.0	5.0	November 27	I	10.3	6.6	12.5
	II	13.1	8.7	99.5		II	10.6	7.0	31.3		II	10.4	6.5	124.5
	IV	10.8	7.6	109.2		IV	11.6	8.0	94.7		IV	6.1	4.6	130.4
		12.1	8.3	219.5			11.0	7.5	131.0			9.1	6.0	267.4
September 11	I	11.4	8.5	9.2	October 23	I	11.6	8.4	11.9	December 4	I	10.7	7.7	12.9
	II	13.0	8.6	106.9		II	11.7	7.7	132.6		II	10.1	6.9	150.2
	IV	10.9	7.8	112.0		IV	11.5	7.7	91.8		IV	5.6	4.5	167.5
		12.1	8.3	228.1			11.6	7.8	236.3			8.9	6.4	330.6

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able 67 continued.

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole-sale				Retail	Whole-sale				Retail	Whole-sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
December 11	I	11.9	8.5	12.1	January 22	I	11.3	8.4	14.9	March 5	I	10.7	7.4	15.7
	II	11.0	7.5	146.1		II	11.8	8.3	150.2		II	11.0	7.5	160.2
	IV	7.4	5.6	175.1		IV	9.7	7.4	172.2		IV	8.5	6.0	159.2
		10.1	7.2	333.3			11.1	8.1	337.3			10.2	7.0	335.1
December 18	I	11.1	8.2	14.5	January 29	I	11.2	8.2	14.6	March 12	I	11.7	7.9	12.9
	II	10.8	7.4	138.4		II	11.8	8.3	136.4		II	12.0	8.0	129.9
	IV	8.3	6.0	200.3		IV	10.4	7.0	166.0		IV	10.5	7.5	150.9
		10.1	7.2	353.2			11.3	7.9	317.0			11.5	7.8	293.7
December 24	I	11.8	8.8	18.3	February 5	I	10.9	7.9	17.5	March 19	I	11.2	7.8	14.5
	II	11.6	8.0	177.6		II	11.2	7.9	144.2		II	11.3	7.6	133.8
	IV	9.3	6.2	185.7		IV	9.8	7.3	176.3		IV	10.6	7.6	165.0
		11.0	7.6	381.6			10.7	7.7	338.0			11.1	7.6	313.3
December 31	I	11.7	8.6	11.8	February 12	I	12.1	8.1	13.4	March 26	I	11.7	8.1	13.6
	II	10.8	7.4	149.9		II	11.4	7.8	130.8		II	11.7	7.9	131.4
	IV	8.4	6.1	148.8		IV	10.0	7.7	184.3		IV	10.6	7.7	175.8
		10.3	7.3	310.5			11.1	7.8	328.5			11.4	7.9	320.8
1949														
January 8	I	10.1	7.3	4.1	February 19	I	11.4	7.7	14.2	April 2	I	12.5	8.5	12.3
	II	7.8	5.6	55.1		II	11.4	7.6	128.0		II	11.5	7.8	130.0
	IV	8.4	6.9	154.3		IV	9.5	7.0	197.5		IV	10.7	7.7	144.8
		8.5	6.3	213.5			10.8	7.4	339.7			11.5	7.9	287.1
January 15	I	11.4	8.4	14.3	February 26	I	10.8	7.5	14.8	April 9	I	12.3	8.4	12.5
	II	11.5	8.0	146.7		II	10.9	7.3	149.6		II	11.9	8.0	128.5
	IV	8.9	7.2	186.0		IV	7.1	5.1	203.4		IV	11.6	7.8	184.0
		10.7	7.9	347.0			9.8	6.7	367.8			11.9	8.0	325.0

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ble 67 continued.

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume			
		Retail	Whole- sale				Retail	Whole- sale				Retail	Whole- sale				
		cents		100			cents		100			cents		100			
		per pound		pounds			per pound		pounds			per pound		pounds			
April	16	I	12.3	8.3	12.9	May	28	I	13.2	9.9	12.6	July	2	I	15.3	10.7	9.1
		II	12.4	8.4	129.7			II	13.9	9.6	117.1			II	15.3	10.2	99.1
		IV	11.6	8.0	152.5			IV	12.3	9.4	168.5			IV	11.4	9.4	101.5
			12.1	8.3	295.1				13.3	9.6	298.2				14.2	10.1	209.7
April	23	I	12.7	8.8	13.3	June	4	I	14.1	10.3	8.7	July	9	I	15.5	10.6	7.3
		II	12.4	8.4	126.5			II	14.2	9.8	101.3			II	15.3	10.2	72.9
		IV	11.3	8.1	174.9			IV	13.0	9.6	127.3			IV	13.2	9.5	84.4
			12.1	8.4	314.7				13.8	9.8	237.3				14.7	10.1	164.6
April	30	I	12.0	8.4	14.1	June	11	I	14.1	10.6	10.3	July	16	I	15.5	10.7	6.9
		II	12.6	8.6	110.2			II	14.5	10.1	98.6			II	15.4	10.3	78.3
		IV	11.7	8.1	160.5			IV	13.2	9.9	157.7			IV	13.2	9.6	82.5
			12.2	8.4	284.8				14.0	10.1	266.6				14.8	10.2	167.7
May	7	I	12.6	8.8	13.2	June	18	I	14.8	11.0	7.9	July	23	I	15.9	11.0	5.8
		II	12.4	8.5	122.6			II	14.6	10.1	96.6			II	15.7	10.4	71.1
		IV	11.8	8.8	153.4			IV	14.1	10.1	117.4			IV	13.8	9.3	67.5
			12.3	8.6	289.2				14.5	10.3	221.9				15.2	10.2	144.4
May	14	I	12.6	8.9	11.5	June	25	I	15.7	11.3	8.4	July	30	I	15.8	11.2	5.6
		II	12.7	8.8	115.1			II	15.0	10.4	95.9			II	15.6	10.3	73.6
		IV	12.3	9.2	161.6			IV	11.5	9.6	117.4			IV	14.2	9.4	60.7
			12.6	8.9	288.2				14.1	10.4	221.7				15.2	10.2	139.9
May	21	I	13.6	9.3	11.7												
		II	13.7	9.4	118.6												
		IV	12.5	9.4	157.3												
			13.3	9.4	287.6												

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Source: Derived from primary data compiled in sample stores as specified by G. M. Kuznets in Appendix Note, "Design of Sample," in Sidney Hoos, Daily Prices and Retail Margins, Oranges, Lemons, and Grapefruit, Denver, August 1948-July 1949 (Berkeley: University of California, Division of Agricultural Sciences, Agricultural Experiment Station, July, 1954), 138p. (Giannini Foundation Mimeographed Report No. 168.) For Group IV stores, the basic sample was modified by expansion as noted in text of this report (see p. 4). The price data in the fourth line for each week represent the weighted average prices for all stores combined in the sample, and the retail sales volume data in the fourth line of each week represent the total retail sales for all the stores combined.

TABLE 68

Lemons: Weekly Retail and Wholesale Prices and Retail Sales Volume
by Store Groups, Denver, August 1948-July 1949

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	
		Retail	Whole- sale				Retail	Whole- sale				Retail	Whole- sale		
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds	
48															
ust	7	I	17.6	11.8	2.3	September 18	I	17.8	12.5	2.9	October 30	I	17.8	12.6	1.9
		II	17.8	11.7	34.5		II	18.2	12.2	31.5		II	18.0	11.6	21.3
		IV	15.6	9.3	29.4		IV	15.5	12.2	30.2		IV	17.0	11.0	21.8
			17.1	11.0	66.2			17.3	12.3	64.6			17.7	11.6	45.0
ust	14	I	17.4	11.4	3.7	September 25	I	18.0	13.0	2.4	November 6	I	18.0	12.4	2.0
		II	17.0	10.6	38.8		II	17.8	12.5	26.0		II	17.9	11.3	23.1
		IV	13.3	9.0	38.6		IV	16.5	12.2	26.7		IV	17.0	11.2	19.2
			16.0	10.3	81.1			17.5	12.5	55.1			17.7	11.5	44.3
ust	21	I	16.8	10.4	4.4	October 2	I	17.6	12.7	2.3	November 13	I	18.2	12.5	2.0
		II	16.2	9.8	39.2		II	18.0	12.3	25.1		II	17.8	11.4	21.0
		IV	14.0	8.6	39.2		IV	17.0	11.4	21.6		IV	17.3	11.8	17.5
			15.7	9.6	82.8			17.6	12.1	49.0			17.7	11.7	40.5
ust	28	I	16.8	10.2	3.8	October 9	I	17.7	12.5	1.5	November 20	I	18.2	12.7	2.2
		II	15.4	9.2	33.2		II	18.3	12.0	23.8		II	18.0	11.8	22.4
		IV	14.1	10.7	32.7		IV	16.9	11.3	19.4		IV	17.3	12.0	20.0
			15.3	9.8	69.7			17.8	11.9	44.7			17.8	12.0	44.6
tember	4	I	17.4	11.3	4.6	October 16	I	18.9	13.4	0.7	November 27	I	18.0	12.9	2.0
		II	16.5	10.6	40.4		II	18.7	11.8	19.2		II	18.4	12.4	22.1
		IV	14.6	12.4	43.8		IV	16.9	11.3	20.8		IV	17.5	12.1	17.8
			16.1	11.3	88.8			18.2	12.0	40.7			18.1	12.4	41.9
tember	11	I	17.2	12.4	3.1	October 23	I	18.0	12.9	1.7	December 4	I	18.2	13.1	1.9
		II	17.5	11.7	29.1		II	18.5	11.7	20.4		II	18.3	12.5	23.2
		IV	15.2	11.6	24.7		IV	17.0	11.0	18.7		IV	18.0	11.6	19.2
			16.8	11.8	56.9			18.0	11.7	40.8			18.2	12.4	44.3

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Table 68 continued.

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole-sale				Retail	Whole-sale				Retail	Whole-sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
December 11	I	18.4	13.3	1.8	January 22	I	20.9	14.7	2.1	March 5	I	21.8	15.8	2.1
	II	18.4	12.6	25.3		II	21.2	15.0	19.6		II	21.7	15.7	19.9
	IV	18.2	12.5	18.7		IV	21.8	16.9	19.3		IV	21.6	15.3	19.3
		18.3	12.7	45.8			21.3	15.5	41.0			21.7	15.6	41.3
December 18	I	18.4	13.1	2.0	January 29	I	22.1	15.6	2.3	March 12	I	22.3	15.9	1.9
	II	18.4	12.7	21.1		II	21.7	15.6	21.2		II	22.3	15.5	20.3
	IV	18.2	12.5	19.8		IV	22.1	14.4	21.3		IV	21.7	15.3	22.3
		18.3	12.7	42.9			21.9	15.3	44.8			22.1	15.5	44.4
December 24	I	18.5	13.3	3.1	February 5	I	23.7	16.4	2.3	March 19	I	22.3	15.9	1.7
	II	18.4	12.6	23.9		II	21.9	15.7	20.7		II	22.3	15.4	19.1
	IV	18.2	12.3	21.8		IV	20.8	15.1	19.8		IV	21.7	15.4	17.1
		18.4	12.7	48.7			22.0	15.7	42.8			22.1	15.5	37.9
December 31	I	18.5	13.4	1.9	February 12	I	23.6	16.1	1.9	March 26	I	22.1	16.1	2.5
	II	18.0	12.4	21.8		II	22.1	15.6	19.5		II	22.8	15.7	19.2
	IV	18.0	12.1	17.4		IV	21.3	12.8	19.1		IV	22.1	15.5	19.2
		18.1	12.5	41.1			22.2	14.9	40.5			22.4	15.7	40.9
1949														
January 8	I	18.7	13.6	0.5	February 19	I	23.3	16.2	1.9	April 2	I	21.7	16.3	2.3
	II	18.9	12.8	19.8		II	20.9	15.1	21.1		II	22.8	15.9	18.1
	IV	17.8	12.5	20.0		IV	21.5	15.3	20.7		IV	21.5	14.5	19.9
		18.5	12.9	40.3			21.6	15.4	43.7			22.2	15.6	40.3
January 15	I	19.0	13.6	2.2	February 26	I	22.9	15.8	2.1	April 9	I	22.5	16.1	1.8
	II	20.4	13.9	23.6		II	21.8	15.5	19.5		II	22.6	15.9	18.2
	IV	18.0	16.2	21.5		IV	21.5	15.4	19.6		IV	20.9	14.4	20.8
		19.4	14.5	47.3			21.9	15.5	41.2			22.1	15.5	40.8

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Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole-sale				Retail	Whole-sale				Retail	Whole-sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
April 16	I	22.0	15.7	1.6	May 28	I	22.3	15.5	2.0	July 2	I	23.4	16.9	4.2
	II	22.3	15.0	20.1		II	21.4	14.4	24.5		II	23.6	16.1	39.3
	IV	20.3	12.4	24.0		IV	22.1	14.7	23.1		IV	24.4	16.2	43.3
		21.7	14.4	45.7			21.8	14.7	49.6			23.8	16.3	86.8
April 23	I	21.7	16.2	1.8	June 4	I	23.4	15.6	2.1	July 9	I	24.0	17.1	2.9
	II	21.3	14.6	22.7		II	21.9	15.3	19.6		II	24.0	16.8	28.1
	IV	18.6	11.7	23.0		IV	20.8	15.2	23.6		IV	24.8	15.3	37.6
		20.6	14.1	47.5			21.9	15.3	45.3			24.2	16.4	68.6
April 30	I	22.5	15.3	2.6	June 11	I	23.7	16.1	2.4	July 16	I	24.0	17.0	2.9
	II	21.0	13.5	19.6		II	21.7	15.5	22.1		II	24.2	17.6	30.3
	IV	16.7	11.2	24.9		IV	20.3	14.4	24.0		IV	24.3	15.0	35.1
		20.1	13.2	47.1			21.7	15.3	48.5			24.2	16.7	68.3
May 7	I	22.4	14.8	2.2	June 18	I	23.9	16.3	3.1	July 23	I	24.5	17.2	3.2
	II	20.0	13.2	22.2		II	21.9	15.5	25.6		II	24.5	16.7	32.9
	IV	16.0	10.9	26.9		IV	22.1	15.6	32.7		IV	23.4	15.3	36.2
		19.3	12.9	51.3			22.4	15.7	61.4			24.2	16.4	72.3
May 14	I	22.7	14.3	1.9	June 25	I	23.9	16.7	4.1	July 30	I	24.6	17.5	3.5
	II	20.2	12.9	19.5		II	22.4	15.6	34.3		II	24.1	16.7	33.4
	IV	16.2	12.5	22.6		IV	22.3	17.1	42.4		IV	21.8	14.2	39.5
		19.6	13.1	44.0			22.7	16.3	80.8			23.5	16.1	76.4
May 21	I	21.4	13.9	1.7										
	II	20.6	13.2	20.5										
	IV	20.2	15.5	21.6										
		20.7	14.0	43.8										

Source: Derived from primary data compiled in sample stores as specified by G. M. Kuznets in Appendix Note, "Design of Sample," in Sidney Hoos, Daily Prices and Retail Margins, Oranges, Lemons, and Grapefruit, Denver, August 1948-July 1949 (Berkeley: University of California, Division of Agricultural Sciences, Agricultural Experiment Station, July, 1954), 138p. (Giannini Foundation Mimeographed Report No. 168.) For Group IV stores, the basic sample was modified by expansion as noted in text of this report (see p. 4). The price data in the fourth line for each week represent the weighted average prices for all stores combined in the sample, and the retail sales volume data in the fourth line of each week represent the total retail sales for all the stores combined.

TABLE 69

Grapefruit: Weekly Retail and Wholesale Prices and Retail Sales Volume
by Store Groups, Denver, August 1948-July 1949

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole- sale				Retail	Whole- sale				Retail	Whole- sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
1948														
August 7	I	9.5	8.4	1.6	September 18	I	11.0	8.0	1.2	October 30	I	8.7	6.0	6.7
	II	11.1	7.5	16.7		II	11.7	7.6	16.3		II	10.2	6.3	76.1
	IV	11.5	7.6	20.9		IV	10.3	6.9	31.2		IV	7.1	4.3	87.6
		10.9	7.7	39.2			11.1	7.5	48.7			9.0	5.7	170.4
August 14	I	9.2	8.1	1.4	September 25	I	10.3	7.5	1.8	November 6	I	8.4	5.5	7.5
	II	11.6	7.5	18.3		II	11.0	7.2	18.6		II	9.3	5.7	81.7
	IV	11.5	7.8	31.3		IV	10.9	6.5	23.6		IV	6.2	4.3	123.8
		11.1	7.7	51.0			10.8	7.1	44.0			8.2	5.3	213.0
August 21	I	9.0	8.3	1.5	October 2	I	9.4	6.9	2.7	November 13	I	8.0	5.2	5.5
	II	11.8	8.0	12.4		II	11.1	6.8	25.3		II	8.8	5.2	82.1
	IV	11.5	8.3	19.9		IV	8.2	5.7	32.4		IV	6.2	4.0	140.0
		11.1	8.2	33.9			9.9	6.5	60.4			7.9	4.9	227.6
August 28	I	9.1	8.1	1.3	October 9	I	9.7	6.5	1.3	November 20	I	7.6	4.8	6.8
	II	11.8	8.1	13.2		II	10.9	6.7	21.7		II	8.4	4.9	87.4
	IV	11.5	8.0	24.4		IV	9.2	5.9	41.0		IV	5.7	4.0	153.3
		11.1	8.1	38.9			10.2	6.4	64.0			7.4	4.6	247.5
September 4	I	8.9	8.0	1.3	October 16	I	9.7	6.3	0.3	November 27	I	7.3	4.9	7.6
	II	12.3	8.3	12.5		II	11.4	6.5	10.9		II	8.5	4.8	96.2
	IV	11.5	8.0	26.0		IV	9.3	5.9	41.5		IV	6.1	4.6	131.1
		11.4	8.2	39.8			10.4	6.3	52.7			7.6	4.8	234.9
September 11	I	9.8	7.9	1.4	October 23	I	9.4	6.8	4.5	December 4	I	7.4	4.8	6.0
	II	12.0	8.1	11.4		II	11.1	6.8	56.6		II	7.9	4.6	97.3
	IV	11.5	6.8	16.6		IV	8.9	5.7	69.2		IV	5.9	4.1	151.5
		11.4	7.7	29.4			10.1	6.5	130.3			7.2	4.5	254.8

able 69 continued.

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole-sale				Retail	Whole-sale				Retail	Whole-sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
December 11	I	7.1	4.8	8.0	January 22	I	7.6	5.4	11.5	March 5	I	7.9	5.7	9.3
	II	7.8	4.6	95.2		II	7.9	5.0	106.4		II	9.1	5.4	101.0
	IV	5.6	4.0	141.0		IV	5.6	4.0	163.9		IV	7.4	5.5	123.9
		7.0	4.5	244.2			7.2	4.8	281.8			8.4	5.5	234.2
December 18	I	6.9	4.7	8.4	January 29	I	7.6	5.5	11.1	March 12	I	8.3	6.0	11.3
	II	7.6	4.7	101.6		II	8.0	5.1	115.1		II	9.1	5.8	89.5
	IV	5.7	4.0	150.3		IV	6.1	4.6	170.0		IV	9.1	6.3	124.8
		6.9	4.5	260.3			7.4	5.0	296.2			8.9	6.0	225.6
December 24	I	7.0	5.2	11.2	February 5	I	7.7	5.5	12.5	March 19	I	8.4	6.1	11.2
	II	7.5	4.8	100.6		II	7.9	5.0	116.4		II	9.7	6.2	94.1
	IV	5.5	3.9	138.7		IV	6.1	4.4	168.9		IV	9.1	6.3	123.6
		6.8	4.6	250.5			7.3	4.9	297.8			9.3	6.2	228.9
December 31	I	7.3	5.1	9.3	February 12	I	7.6	5.4	12.3	March 26	I	8.4	6.2	10.8
	II	7.5	4.7	81.5		II	8.2	5.2	104.8		II	9.1	5.8	103.1
	IV	5.5	3.9	134.8		IV	6.6	4.7	165.6		IV	9.1	6.6	126.4
		6.9	4.6	225.6			7.6	5.1	282.7			9.0	6.1	240.3
1949														
January 8	I	6.6	4.4	6.4	February 19	I	7.9	5.6	9.6	April 2	I	8.3	6.2	10.9
	II	7.7	4.8	15.3		II	8.4	5.3	100.3		II	9.6	6.2	86.8
	IV	5.4	4.1	128.0		IV	6.2	4.5	170.1		IV	9.1	6.6	115.9
		6.8	4.5	149.7			7.7	5.1	280.0			9.2	6.3	213.6
January 15	I	7.1	5.1	10.3	February 26	I	8.0	5.7	11.0	April 9	I	8.9	6.5	11.0
	II	7.9	4.9	106.8		II	8.4	5.2	96.5		II	9.5	6.1	91.5
	IV	5.9	4.2	163.0		IV	6.0	4.3	170.0		IV	9.2	6.7	133.5
		7.2	4.7	280.1			7.6	5.0	277.5			9.3	6.4	236.0

(Continued on next page.)

Table 69 continued.

Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume	Week ending	Store group	Prices		Retail sales volume
		Retail	Whole-sale				Retail	Whole-sale				Retail	Whole-sale	
		cents per pound		100 pounds			cents per pound		100 pounds			cents per pound		100 pounds
April 16	I	9.3	6.6	12.1	May 28	I	11.2	8.1	8.1	July 2	I	12.4	9.4	1.8
	II	9.8	6.5	92.9		II	12.0	8.2	78.3		II	13.8	9.1	23.2
	IV	9.2	7.2	130.1		IV	12.1	9.3	72.7		IV	7.6	9.8	22.0
		9.5	6.7	235.1			11.9	8.5	159.1			11.7	9.4	47.0
April 23	I	9.7	6.9	10.2	June 4	I	11.7	8.5	7.8	July 9	I	12.7	9.4	1.5
	II	10.4	7.0	86.9		II	12.4	8.7	56.4		II	13.5	8.8	12.9
	IV	9.8	7.5	124.9		IV	12.6	9.7	52.4		IV	6.8	9.8	20.0
		10.1	7.1	222.0			12.3	8.9	116.6			11.4	9.2	34.4
April 30	I	9.9	7.2	9.3	June 11	I	12.2	9.2	6.8	July 16	I	12.2	9.2	1.2
	II	10.9	7.3	71.9		II	12.8	8.9	50.5		II	13.9	9.1	15.9
	IV	10.3	7.9	105.2		IV	12.9	9.5	41.0		IV	6.8	9.6	6.9
		10.5	7.5	186.4			12.7	9.1	98.3			11.5	9.3	24.0
May 7	I	9.6	7.6	10.3	June 18	I	12.7	9.2	4.2	July 23	I	11.5	8.8	1.2
	II	11.2	7.3	70.3		II	12.4	8.9	37.1		II	13.7	9.1	14.9
	IV	10.8	8.5	105.8		IV	13.7	9.4	30.7		IV	12.7	9.2	3.8
		10.7	7.7	186.4			12.8	9.1	72.0			12.9	9.1	19.9
May 14	I	9.8	7.8	8.7	June 25	I	12.9	9.0	2.8	July 30	I	11.4	8.8	1.3
	II	11.3	7.5	71.5		II	13.6	9.1	29.1		II	13.4	9.0	10.9
	IV	10.8	8.7	110.0		IV	13.3	9.4	23.2		IV	12.6	8.9	3.1
		10.8	7.9	190.2			13.4	9.2	55.1			12.7	8.9	15.3
May 21	I	10.8	7.9	8.0										
	II	11.5	7.7	76.8										
	IV	11.0	8.6	92.4										
		11.2	8.0	177.2										

Source: Derived from primary data compiled in sample stores as specified by G. M. Kuznets in Appendix Note, "Design of Sample," in Sidney Hoos, Daily Prices and Retail Margins, Oranges, Lemons, and Grapefruit, Denver, August 1948-July 1949 (Berkeley: University of California, Division of Agricultural Sciences, Agricultural Experiment Station, July, 1954), 138p. (Giannini Foundation Mimeographed Report No. 168.) For Group IV stores, the basic sample was modified by expansion as noted in text of this report (see p. 4). The price data in the fourth line for each week represent the weighted average prices for all stores combined in the sample, and the retail sales volume data in the fourth line of each week represent the total retail sales for all the stores combined.